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ABSTRACT

In compliance with section 951 of Public Law 94-63, this second annual report presents and anlayzes information on the supply and distribution of and requirements for nurses. Chapter 1 presents three models on the requirements for nursing personnel in the nation: The Vector Model (impact of health system changes), Pugh Roberts Model (the system dynamics -- national model), and the Western Interstate Commission on Higher Education (NICHE) Model (the state model approach to requirements). Supply models and supply projections are discussed in chapter 2. Chapter 3 examines supply and requirements comparisons, including a national overview, registered nurses with advanced training, and nurse practitioners. Chapter 4 discusses factors affecting supply and requirements: new additions to the nursing population, characteristics of the licensed nurse population, employment distribution, and average compensation of nursing personnel. Chapter 5 examines the distribution of supply and requirements in the states. Finally, chapter 6 presents conclusions about aggregate national supply and requirements. The appendix includes a copy of section 951 and report tables. (JH)

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SECOND REPORT TO THE CONGRESS MARCH 15, 1979 (REVISED)

NURSE TRAINING ACT OF 1975

REPORT OF THE SECRETARY OF
HEALTH, EDUCATION, AND WELFARE
ON THE SUPPLY AND DISTRIBUTION OF
AND REQUIREMENTS FOR NURSES
AS REQUIRED BY SECTION 951,
NURSE TRAINING ACT OF 1975
TITLE IX, PUBLIC LAW 94-63

HEALTH MANPOWER REFERENCES

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EXECUTIVE SUMMARY

As of January 1977, the estimated number of registered nurses actively employed was 1,011,000; the estimated number of licensed practical nurses actively employed was 498,000. For registered nurses the full-time equivalent number was 854,000 because of the large number who work part time; the full-time equivalent of licensed practical nurses was 437,000.

Graduations from generic registered nurse education programs have increased markedly from 34,497 in the 1964-65 academic year, to 77,065 in the 1975-76 academic year. This increase, plus an increase in the proportion of the nurse population who were employed in nursing, has resulted in relatively high growth rates in the registered nurse supply. The report shows that even with this growth, registered nurses are being absorbed into the work force at a high rate. Moreover, a 1974 study of experienced nurses showed that only 2.3 percent of the total registered nurse population were unemployed and actively seeking work. A 1976 study of newly registered nurses showed the same low rates. The proportion of unemployed nurses is considerably lower than that for the entire U.S. labor force.

Still another concern addressed in this report is the matter of geographic distribution of nurses. Data in the report point to an uneven distribution. This is a problem shared by all health professions. However, the distribution of the nurse supply depends on the availability of settings for practice, the willingness of nurses to locate in the area, and other factors not addressed in this document.

In addition to information on nurse supply, including its geographic distribution, the report also provides a range of projections on national and State requirements from a number of different models which examine a variety of assumptions about the future demand and need for nurses. This presentation of a range for considering requirements was selected because there is no simple answer to the complex problem of predicting future requirements. Models were also developed to project and examine the future supply of nurses. The objective of all of the studies and analyses was to provide a more definitive statistical and analytic basis on which to discuss the preparation, deployment, and utilization of nurses for the country as a whole and for the individual States, and thereby to facilitate long-range planning for the national nurse supply.

Assuming even moderate changes occur in the health care delivery system, the overall supply of registered nurses will be in balance with requirements over the next decade. (See Chapter 6 for a more detailed discussion regarding adequacy of supply.) Shortages might occur if a national health insurance plan which significantly increases utilization were enacted and/or the utilization and responsibilities for registered nurses were increased substantially. However, significant increases in utilization are highly unlikely in the face of current and future cost containment efforts.

Shifts in the delivery of health care from institutional to ambulatory and home care settings, would require nurses skilled in assessing health states, in applying techniques to maintain health and prevent illness, and in assisting individuals and families to cope with the effects of illness and disability. Pressures to control escalating costs of hospital care, furthermore, might encourage greater use of nursing homes, rehabilitation centers, and convalescent care facilities, where nurses are the primary providers of care and assume responsibility for its management over time. In acute care settings, the complexities of care and the use of sophisticated treatment modalities assumed in the analyses would further point to the consideration of the need for nurses with advanced preparation in special areas of practice.

A related issue is the potential need for increasing the number of prepared faculty, administrators, researchers, and clinicians. With the maintenance of present conditions, the supply of nurses with master's or doctoral degrees will increase 131 percent by 1990, to constitute 6 percent of the anticipated full-time equivalent supply. The adequacy of these numbers needs to be examined in view of considerations raised above concerning any change in the composition of the nursing supply.

In examining options regarding the nature and extent of future Federal support for nursing education, we should consider the need for nurses prepared to assume increased responsibilities for education, primary care, specialized practice, and management of complex nursing services, for improving practice by expanding the scientific base of nursing knowledge, and for encouraging efforts to achieve better access to services. At this time, the Administration proposes an extension of the nursing special projects and nurse practitioner program authorities under Title VIII.

Because of the need to examine the nursing picture from a variety of aspects and premises, the findings from all these studies, along with data from a variety of other sources, are included in this Second Report to the Congress. Subsequent reports will include additional and more refined information on nurse supply and requirements.

Present authorities for Federal support of health manpower under the Health Professions Education Act of 1976 expire in 1980. In that context, the Department has undertaken an extensive review of all aspects of its role in manpower development and training, including nursing education. Issues of nurse training in general, and the findings of this report in particular, will be considered in that process. Over the coming year the Administration will develop a set of legislative proposals which will reflect the outcome of this review, and which will be designed to insure the development of the most appropriate types of high quality manpower for the delivery of health services.

INTRODUCTION

Section 951 of Public Law 94-63 included specific and detailed directives to the Secretary of Health, Education, and Welfare for information respecting the supply and distribution of and requirements for nurses. It required determinations of these on a continuing basis and also the collection of data regarding certain specific factors that affect supply, distribution, and requirements. These data were to be used to determine the adequacy of the supply in relation to the population and the demand for nursing services. The section further specified the submission of annual reports to the Congress that would include a compilation and analysis of such determinations and data, and would incorporate recommendations for legislation to achieve an equitable distribution and adequate supply of nurses within the United States and within each State.

Information was requested in two general areas: (1) the supply and distribution of and requirements for nursing personnel on a current and projected basis, for the Nation as a whole and within each State, and the demand for the services which these nursing personnel provide, and (2) the number and distribution of nursing personnel within the United States and within each State according to educational levels, activity status, rates of compensation, specialty preparation, and migration data on nurses entering the United States from other countries. A copy of section 951 is included in Appendix I.

An elaborate procedural plan for data acquisition and analysis was developed to meet these statutory requirements for data. The scope of the data requirements covered over 2.5 million individuals functioning in the health care system, or having qualifications to so function, while the specificity of the data requested necessitated separate examination of relatively small segments of the total. The variety and complexity of the data needs militated against the use of a single collection mechanism, and called for an approach that would integrate analysis of data collected in a number of different ways and through different sources. Accordingly, as a first step, the various data elements were analyzed and those in existing sources and their current status were identified. The statistical information accumulated over the years through regular, ongoing data collections by various agencies, was used for the descriptive review of nursing resources and for the necessary background to the analytical interpretations. While the Division of Nursing, over the past several years, had engaged in an intensive program to develop new tools and techniques for analyzing nursing resources and requirements, efforts were also initiated primarily for the requirements of section 951.

Parts I and II of the First Report to the Congress, February 1, 1977, contained a summary of data available at that time, an identification of various gaps in the data, and an explanation of the way in which information from ongoing projects would provide the information for future reports.

The study of requirements for nursing personnel, particularly for registered nurses, was approached in several different ways with a number of different objectives. One of the projects undertaken (by Vector Research, Inc.) was an assessment of the impact of three anticipated changes in the health care system: the introduction of national health insurance, the increased enrollment in health maintenance organizations, and the reformulation of nursing roles. These were looked at on both the national and State level. Another project (System Dynamics National Model) approached the study from a national perspective, through the analysis of factors affecting nursing requirements and resources and the interaction of each upon the other. Two other approaches involved the development of techniques to help groups at other than the national level. One of these efforts (WICHE State Model) developed a systematic framework through which a group could make determinations of the health care that might be needed and then relate them to requirements for nursing personnel. Following the development of this approach, the work was extended to provide nationally derived requirements estimates. The other of these two efforts was the development of a model incorporating demand and supply factors into a framework for determining nursing manpower requirements on a sub-State level. Actual estimates of requirements for all sub-State areas in the country were not developed.

In making determinations of what the anticipated supply of nursing personnel might be, new models for the provision of such estimates were developed that utilize data currently in existence and have the capacity to incorporate new types of data as they become available. To assist with the analysis of the distribution of nursing personnel on a sub-State level, a model was developed to provide for a review of county data through a reallocation of registered nurse resources according to population served.

All of the activities outlined above were based on the utilization of data already in existence on the supply and distribution of nursing personnel and health care services. In addition to these activities, a methodological study was made of the feasibility of and design for the approach to making surveys of registered nurses on a sample basis. Following the completion of this developmental work, the first of these surveys was initiated. The data collection was geared to an examination of factors affecting the supply, distribution, and requirements for registered nurses and to fill in data gaps in existing data sources. In the case of the survey of registered nurses, however, unforeseen delays resulted in first mailing the forms to the sample of nurses in late August 1977. Therefore, it was only possible at this time to examine very preliminary data based on early, incomplete, responses to the study.

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Because of the need to examine the nursing picture from a variety of aspects and premises, the findings from all these studies, along with data from a variety of other sources, are included in this Second Report to the Congress, March 15, 1979 (revised). Subsequent reports will include additional and more refined information on nurse supply and requirements.

The Department plans to submit within the next year a comprehensive legislative proposal concerning Federal support for health manpower training after present authorities contained in P.L. 94-484 expire in 1980. At that time, recommendations for the Federal support of nursing education will be included with those for all of the health professions. The study findings presented in this report, subject to further refinement and validation, will comprise one element underlying the comprehensive proposal. At this time, the Department proposes a 2-year extension of selected program authorities under Title VIII so that this program will come up for reconsideration at the same time as the Title VII authorities.

Chapter 1

REQUIREMENTS FOR NURSING PERSONNEL IN THE NATION AS A WHOLE - THREE VIEWS

The estimation of requirements for nursing personnel is a particularly complex process. Nursing personnel are used throughout the health care structure in many different capacities. Their roles span health teaching and counseling and the prevention of illness and the maintenance of health, as well as the care of the sick at home, in ambulatory care centers, and in institutions. Thus, almost every aspect of the intricacies of health care should be touched upon and examined in determining requirements for nursing personnel.

Nursing itself also presents a complex situation for study. Included within the scope of the term "nursing" there are three broad groups: nursing aides, practical nurses, and registered nurses. For the registered nurse group a wide variety of functions and responsibilities must be considered including those areas in which the registered nurse acts in an assisting or collaborative relationship with other health practitioners, those areas in which the registered nurse has an independent role, and those areas in which the registered nurse provides leadership through administering or supervising nursing activities or through teaching nursing students or other health care students and practitioners. The utilization of nursing skills and of nurses themselves varies from setting to setting and all of these areas must be considered in determining requirements for nursing personnel and the type of nursing personnel needed.

Added to these considerations are those concerned with the term "requirements." That is, requirements can be considered in terms of "need"--the number that expert opinion believes is appropriate to provide a state of health consonant with existing knowledge; or in terms of "want"--the quantity of services the population feels it ought to consume given its own perceptions of health care needs. Requirements can also be thought of in terms of "demand"--the quantity of services that would be consumed depending upon prices of goods and services, financial resources, size and psychological wants of the population as reflected by consumers' taste and preferences for all goods and services. Finally, projected requirements can be a function of assumptions about changes in the utilization of health manpower, which in turn are related to the dynamics of the specific occupation being studied. Since prospective requirements for nursing personnel are dependent both on how nurses will be used within the health care structure and on possible reorganizations or other changes that might occur within the health care system, a multiplicity of alternatives must be explored under these concepts. Some approaches handle these problems explicitly, others implicitly.

Given these complexities, and the mandate to provide data on requirements from a State as well as a national viewpoint and for the varying levels and types of nursing personnel, it was felt necessary to engage in a variety of studies that would examine the controversial and elusive question of requirements from a number of points of view, utilizing different types of methodologies. Each of the studies approached the question differently using different assumptions, time frames, and definitions of requirements, and encompassing differing geographic detail as well as differing detail on levels and types of nursing personnel.

This chapter contains a summary of the findings indicated by each of three modeling efforts. The models included here, Vector Model, System Dynamics National Model, and WICHE (Western Interstate Commission for Higher Education) State Model, are those which produced national estimates of requirements. A fourth modeling effort which dealt with the question of requirements, the Micro-Model, did not produce nation wide data. However, the techniques of that model are discussed in the chapter, Distribution of Supply and Requirements in States.

The First Report to the Congress, February 1, 1977, contained a detailed methodological description of each of the models. In this report, the results have been abstracted from the complete individual reports of each study along with certain of the critical assumptions and approaches underlying the results.

Impact of Health System Changes - The Vector Model

In June 1974, the Division of Nursing contracted with Vector Research, Inc. to assess the impact of three anticipated changes in the health care system on future requirements for registered nurses. The anticipated changes were:

1. the introduction of national health insurance (NHI);

2. the increased enrollment in health maintenance organizations (HMOs); and

3. the reformulation of nursing roles.

The base year selected for the requirements estimates was 1972, with projections to 1985. Requirements were further categorized by major employment settings: non-Federal short-term hospital inpatient units, hospital outpatient units, physicians' offices, nursing homes, HMO clinics, and community health settings. These settings were thought to be most greatly affected by the health care system changes under consideration and contained nearly all employed registered nurses. Other settings, not explicitly identified, where the remainder of employed nurses are located were treated in a less comprehensive fashion, but are also included within the overall estimates derived.

The Vector model predicts requirements for nurses made under several alternative assumptions about the timing and extent of the three health system changes (scenarios). The alternative scenarios include various health insurance plans, different levels of HMO enrollment, and different levels of nursing role reformulation. One such scenario, identified as the "baseline," is the absence of health care system changes, i.e., no NHI, no change in the number of operational HMOs, and no additional role reformulation.

The schematic model structure shown in figure 1 describes the major model components and outlines the conceptual approach employed to assess the future requirements for nurses. Briefly, it is hypothesized that the future requirements for nurses are dependent on three factors: the size and composition of the future population, per capita demand for health care services, and the organizational systems used to provide the services demanded. These three factors correspond to the three major modules of the model--the population module, the demand-for-services module, and the nurse-manpower-requirements module.

The model uses historical RN employment and employment vacancy data to estimate trends in the utilization of full-time equivalency services. These trends are projected into the future to estimate future employment positions in the absence of health system changes.

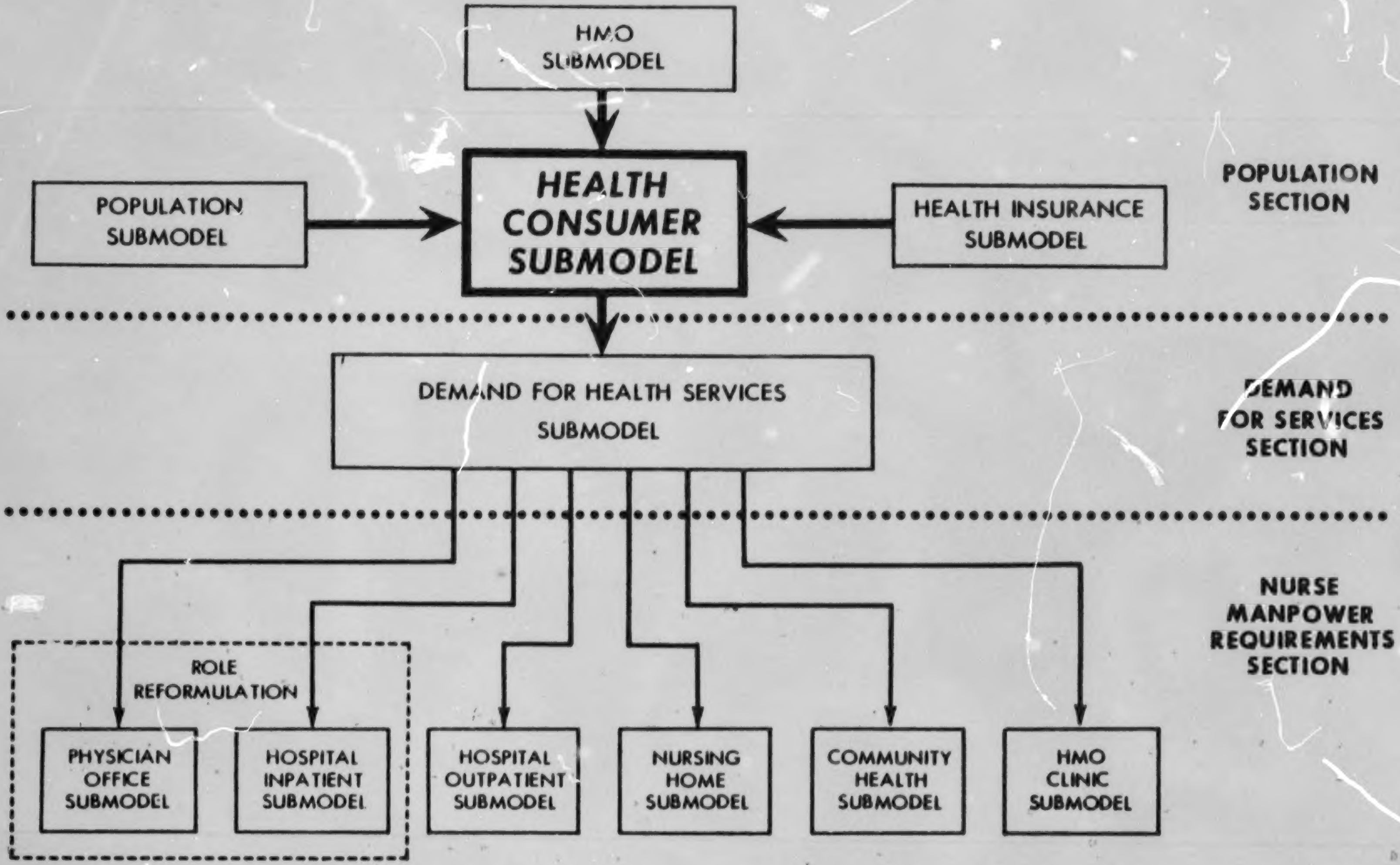
Absence of changes means that: (1) The wages of RNs relative to those of other health personnel and relative to costs of providing health services remain unchanged; (2) the supplies of health system goods and services are perfectly elastic; and (3) the relationship between the health service demands in one setting and those in another setting is unaffected (unless the effect is modeled explicitly, as in the case of HMOs).

The Baseline

The baseline assumption that a national health insurance program will not occur prior to 1985 provides a mechanism for estimating the requirements for RNs in the absence of any significant change in the insurance coverage of the population. As the report of this study indicates, since the number of persons covered by health insurance and the level of insurance benefit found in the insured population are both increasing, the baseline estimates of the population service demands are clearly conservative.

Even though no new HMOs are added during the projection period, the baseline assumes that the HMOs in existence in 1974 will continue to grow at rates derived from historical data. The growth rate of a particular HMO is dependent on its age, with older HMOs growing more slowly. Under these assumptions the HMO population increases from 3.2 percent of the U.S. population in 1974 to 6.7 percent of the population in 1985.

Figure 1 -- Nurse manpower requirements model


HMO SUBMODEL
POPULATION SUBMODEL
HEALTH CONSUMER SUBMODEL
HEALTH INSURANCE SUBMODEL
POPULATION SECTION
DEMAND FOR HEALTH SERVICES SUBMODEL
DEMAND FOR SERVICES SECTION
NURSE MANPOWER REQUIREMENTS SECTION
ROLE REFORMULATION
PHYSICIAN OFFICE SUBMODEL
HOSPITAL INPATIENT SUBMODEL
HOSPITAL OUTPATIENT SUBMODEL
NURSING HOME SUBMODEL
COMMUNITY HEALTH SUBMODEL
HMO CLINIC SUBMODEL

Source: Doyle, et al., The Impact of Health System Changes on the Nation's Requirements for Registered Nurses in 1985, Division of Nursing, HRA, PHS, DHEW Publication No. HRA 78-9, 1978. In press.

The baseline also assumes that there will be no further acceptance of nursing role reformulation, although trends in the intensity of nursing services (RNs-per-patient day) were maintained. The small fraction of inpatient units and ambulatory clinics utilizing nurses in new roles is held constant at the estimated 1972 level. The study report points out that the plausibility of such an occurrence is reasonably low; however, the assumption is necessary to permit analysis of the degree to which changes in these roles influence the requirements for nurses.

Thus, the developers of the model feel that the baseline can be considered a very conservative, albeit possible, projection of the future requirements for RNs. The degree to which it becomes a realistic projection is dependent on the degree to which the system changes investigated here occur, or on the extent of other changes not foreseen or treated in this analysis.

The baseline provides a meaningful way to compare alternative scenarios and to assess the impact of implementing various health care system changes. It represents the situation in which the health care system continues on its present course, without the initiation of a national health insurance program, with limited increases in HMO enrollment, and sparse adaptation of concepts which lead to the reformulation of nursing roles. When the model is exercised under various scenarios in which one or a combination of health care system changes takes place, the impact of the changes can be measured by comparing the increase in RN requirements under that scenario with the increase in RN requirements under the baseline scenario.

Effect of National Health Insurance on Requirements

To demonstrate the effect of NHI alone on the requirements for full-time equivalent RNs, the requirements under two NHI scenarios were compared to baseline projections. These scenarios differ from the baseline case only with respect to the NHI parameters of the model. As in the baseline scenario, HMO parameters were selected so that no new HMOs were added after 1975, but those in existence at that time continued to grow at historic growth rates. Role reformulation concepts remained the same as in 1972, with (1) 3 percent of hospital inpatient units utilizing primary nursing, and (2) nurse practitioners satisfying 20 percent of unfilled visits to physicians.

Two national health insurance scenarios were examined in this analysis. The first NHI scenario (NHI 1) models the situation in which the uninsured portion of the population receives insurance benefits equivalent to those enjoyed by the insured population. This is intended to represent those NHI bills which guarantee some degree of protection to everyone and thereby plug the gap in current public and private insurance coverage.

The second NHI scenario (NHI 2) is designed to represent the extreme situations in which virtually free and unlimited care is provided to all, and represents the NHI bill supported by organized labor. In both scenarios, the effective implementation year for national health insurance is 1979, and the total impact of NHI is expected to occur within 2 years (1981).

Under NHI 1 it is assumed that as uncovered individuals become covered, they consume health services at the same rate as those in their respective cohorts who previously had health insurance. If the benefits provided by NHI are not as extensive as those afforded the currently insured, then it is supposed that they will supplement their NHI coverage through the purchase of additional private insurance. Therefore, the two factors influencing the increase in service demands under NHI 1 are the fraction of the population insured before the institution of NHI, and the differences between the insured and uninsured populations' demands for health care services.

The NHI 1 scenario would only reduce the price of care to the uninsured population by insuring them at the coinsurance rates experienced by the insured population, i.e., after the institution of NHI the average coinsurance rates of the previously uninsured population is expected to be about 5 percent for hospital inpatient services and 27 percent for ambulatory care.

The NHI 2 scenario assumes that essentially "free care" would be provided to both the insured and uninsured populations, thus reducing the average copayment of the insured population from 5 percent for inpatient services and 27 percent for ambulatory services to zero. The price of care for the uninsured population, who pay the total price for these services, would also be reduced to zero.

HMO Impact on Requirements

There are three factors which affect the impact of HMO enrollment on future nurse requirements--the rate of HMO enrollment growth, the degree to which the per capita demands of HMO enrollees differ from those of the rest of the population, and differences in the nursing resources used to meet these demands. Persons in HMOs utilize about half as many inpatient services per capita as members of the general population. Thus, an increase in HMO enrollment results in a decrease in inpatient days and subsequently in nurse requirements in the inpatient setting.

Also, it is assumed that HMO enrollees will seek ambulatory care in HMO clinics rather than in the more traditional physician's office or outpatient setting. In addition, the intensity of nursing care is somewhat higher in HMO clinics than in other ambulatory clinics. Analysis of detailed data on several HMOs showed that the average number of nurses per ambulatory visit in the base year was higher among HMO enrollees than in other ambulatory clinics by nearly one-third. An increase in HMO enrollment, therefore, reduces the requirement for nurses in the hospital inpatient, outpatient, and physician's office settings while increasing the requirement for HMO clinic nurses.

However, since ambulatory visits per capita among HMO enrollees are about three-fourths the number for the general population, an increase in HMO enrollments will result in little or no net change in requirements for nurses to provide ambulatory care, other factors remaining equal. Thus, the net result of increased HMO enrollment is a reduction in RN requirements, primarily because of the reduction in the demand for inpatient services and the attendant nursing care.

The HMO scenarios differ from the baseline scenario only with regard to the establishment of HMOs in the future. In the baseline case, no new HMOs were established after 1974, but HMOs in existence at that time were assumed to continue to grow at historic rates. Under a moderate growth HMO scenario (HMO 1) it is assumed that the rate of increase in the number of new HMOs per quarter will be identical to the average rate experienced between January 1974 and July 1975. Using this average, 34 new HMOs are projected nationwide each year (from 1975 through 1985), with 8.7 percent of the Nation's population enrolled in HMOs by 1985.

Under a high growth scenario (HMO 2) it is assumed that the number of HMOs established each year is primarily constrained by the number of HMOs then currently in the formational stage of development.

The total number of new HMOs for the Nation is projected to be 65 per year (from 1975 through 1985) by keeping the formational number of HMOs constant at the 1975 average. The percentage of the Nation's population enrolled in HMOs under this scenario (HMO 2) would increase from 2.4 percent in 1972 to 10.6 percent in 1985.

Role Reformulation Effects on Requirements

The effects of role reformulation are treated in the nurse requirements section of the model. However, only those role reformulations which will substantially affect the requirements for nurses are explicitly treated. These include: (1) the employment of nurse practitioners (an example of role expansion in the physician's office environment), (2) the increased utilization of clinical nurse specialists (an example of role expansion in the hospital inpatient environment), and (3) the adoption of the primary nursing concept (an example of changes in task mix in the hospital inpatient setting).

The methodology for treating role expansion in the physician's office environment hinges on several key assumptions. First, it is assumed that physicians will not increase their working hours in order to satisfy the demand for an increased number of office visits. Also, decreasing marginal gains in productivity prevent the physician from expanding his staff indefinitely to satisfy additional demands for services. Consequently, the model assumes that a portion of the services demand in physician's office visits will be supplied by nurses in extended roles.

In the hospital inpatient environment, the influence of clinical nurse specialists' employment in new roles is assessed by determining the number of additional nurses required to replace those who enter these new roles. This increased manpower requirement is derived by estimating the fraction of newly trained clinical nurse specialists that provide services outside of current nursing roles. The effect of primary nursing in the hospital setting is treated by (1) estimating the increase in nurse-to-aide ratios typical of primary nursing units, and (2) predicting the growth of the primary nursing concept.

As is true in the other single health system change scenarios, in the role reformulation scenarios, health insurance and HMO growth parameters were maintained at the levels in the baseline scenario. The role reformulation parameters were changed from the baseline case to isolate the effects of role reformulation acceptance on RN requirements. In the baseline scenario it was assumed that 3 percent of inpatient units in the country would utilize primary nursing and that this percentage would remain constant throughout the projection period. For the moderate acceptance scenario this percentage grows linearly to 40 percent in 1985, and for the high acceptance scenario, 80 percent of all hospital inpatient units employ primary nursing concepts by 1985. Further, in the baseline case no clinical nurse specialists were used in new roles; however, for the moderate acceptance scenario, 75 percent of clinical nursing specialists would be in new roles by 1985, and for the high growth scenario all clinical nursing specialists would be in new roles by 1985. Finally, the degree to which unfilled visits to physicians' offices are satisfied by nurses in practitioner roles is held fixed at 20 percent in the baseline but grows linearly to 65 percent under the moderate role reformulation acceptance scenario and to 100 percent in the high acceptance scenario.

Effects of Combinations of Health System Changes

Since a more likely occurrence would include some combination of the individual health system changes examined, additional scenarios were developed which provide for combinations of these changes. Analysis of combined impact of the changes on the Nation's requirement for RNs found that synergistic effects arise because of interactions between health system changes. Most significant of these was the interaction between NHI and role reformulation. This occurred for two reasons. First, both NHI and role reformulation have considerable impact on the same health care settings. Second, NHI is capable of producing significant changes in health service utilization, thereby stressing the current system's capability to provide these services and stimulating the need for nurses in reformulated roles. This is particularly true in the physician's office setting, where NHI creates demands for office visits that exceed the ability of the projected physician labor force, who are then likely to turn to personnel in extended roles to satisfy these excessive service demands.

To investigate the impact of various combinations of health care system changes, two scenarios were defined in terms of the conditions of the previous scenarios. The moderate scenario (combination 1) consisted of the NHI 1 scenario with moderate HMO growth and moderate acceptance of role reformulation concepts. The high combination scenario (combination 2) consisted of the less conservative scenarios for each of the three health care system changes. Included in this scenario are the institution of the NHI 2 health insurance program, the high growth in HMO enrollment, and the high acceptance of role reformulation concepts.

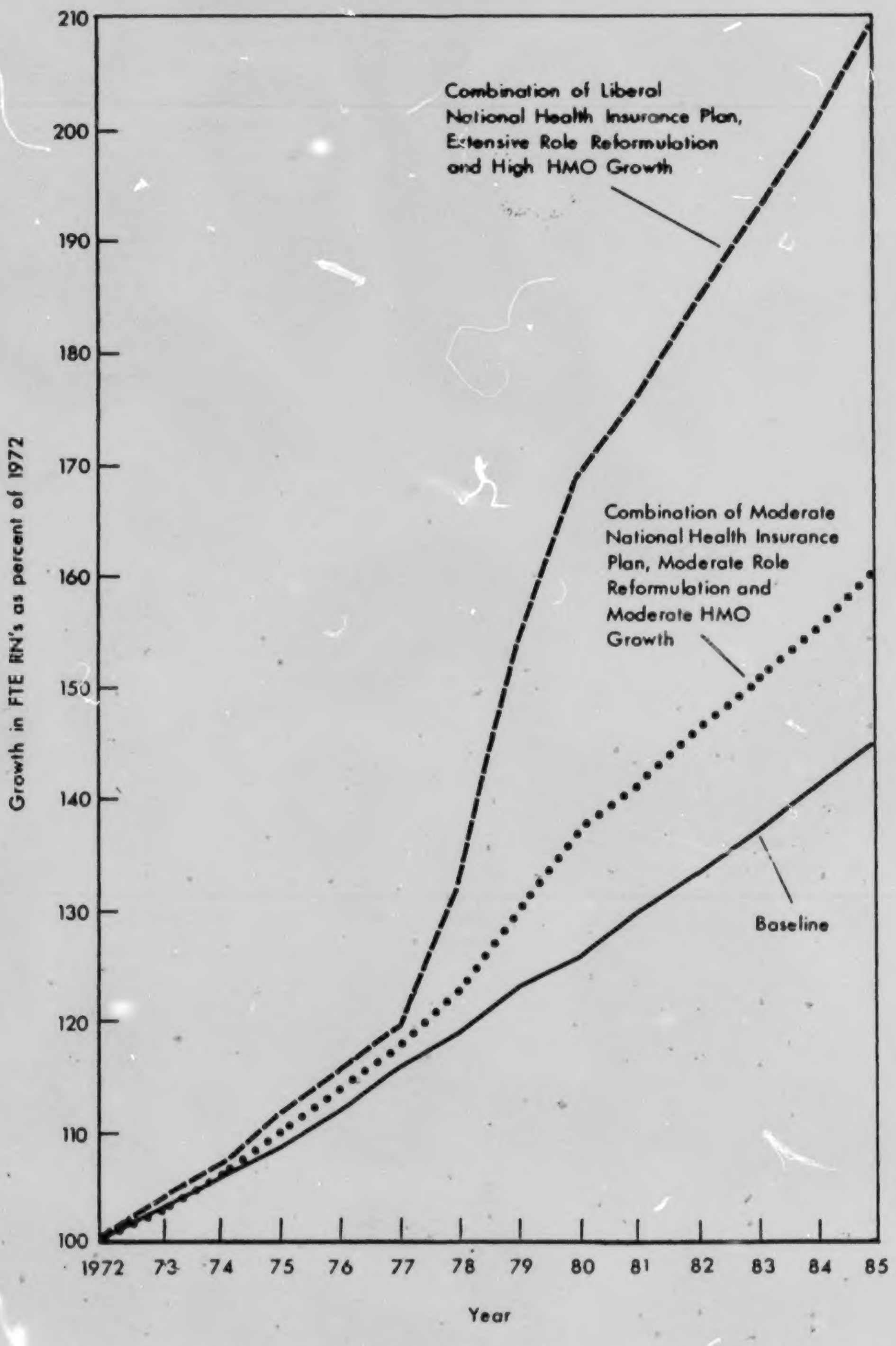
The resultant growth in the requirements for full-time equivalent registered nurses over the span of the projection period for selected scenarios is illustrated in figure 2; table 1 (see Appendix II for all tables) provides the range of estimates made of the requirements for full-time equivalent registered nurses.

The "System Dynamics"--National Model--Pugh-Roberts

The second project in the study of nursing requirements was carried out by the Western Interstate Commission for Higher Education. A full description of the WICHE project is included in a later section. WICHE subcontracted with Pugh-Roberts Associates of Cambridge, Massachusetts, to develop a National Model to analyze the factors affecting nursing requirements and availability of personnel on a long-range basis.

The National Model was developed using a set of techniques known as System Dynamics. The model is concerned with changes taking place and likely to take place in nursing and in health care generally. It focuses on the impact those changes will have on the supply, demand, and distribution of nursing personnel and services. The model was developed primarily as a tool for policymakers--those who make policy through formal governmental processes, and those who make policy informally through the leadership they exert in nursing service and nursing education. It enables those policymakers to pose and receive assistance in answering "what if?" questions about actions, programs, and policies they are considering implementing. These pertain to effects of changes in nursing, such as shifts away from diploma programs and increased numbers of associate degree and baccalaureate graduates, increased coverage of nurses by

Figure 2.-- Growth required in full-time equivalent registered nurses, 1972-1985



Source: Doyle, et al., The Impact of Health System Changes on the Nation's Requirements for Registered Nurses in 1985. Division of Nursing, HRA, PHS, DHEW Publication No. HRA 78-9, 1978. In press.

collective bargaining agreements, emergence of new roles for nursing personnel, and efforts to achieve better geographical distribution of nurses. They also pertain to effects of changes in the overall health care system, such as increases in demand due to a national health insurance program, shifts in task responsibilities among different types of health care personnel, increased pressures to control health care costs, and shifts in health care delivery from institutional to community settings.

The Model Development Process

The National Model was developed with the active involvement of a task force that included representatives of nursing service, nursing education, comprehensive health planning, the Division of Nursing, and WICHE's nursing program staff. The involvement of this task force was an essential part of the model's development, because task force members provided direction that assured that the model would be an accurate representation of the real-world nursing and health care systems and that it could address salient policy issues.

Task force members were responsible for enumerating the set of factors contained in the model and acted as a sounding board through the development of several tentative formulations until an acceptable model structure was achieved. A wide variety of data sources was then used by the Pugh-Roberts consultants to verify the model's cause and effect relationships and to quantify those relationships. Data that characterized nursing employment and education at any point in time (number of nurses employed in each setting or enrollments in nursing programs) were generally available from sources such as the American Nurses' Association's Facts About Nursing, the Division of Nursing's Sourcebook. Nursing Personnel, and the inventories of nurses conducted by the ANA. However, data describing the effects that cause changes to occur in numbers of nurses employed and being educated between one point in time and the next were not readily available.

Task force members became the principal source of data by filling out and discussing questionnaires covering many of the model's relationships. Though these data were "soft" (based on informed estimates rather than on a survey), a careful search of nursing literature and discussions with experts on nursing data revealed that these were the only data available on certain of the model's relationships. Following a thrust central to the System Dynamics approach, these data were used in the model rather than permit the model to disregard relationships judged to be important but for which no data existed. Available data were, of course, used whenever possible.

The Pugh-Roberts consultants used the causal structure developed by the task force and the data assembled to represent the model in the DYNAMO simulation language. Initial simulations were made with the model and reviewed by the task force for their plausibility. Several rounds of revisions and further task force reviews then took place until an acceptable simulation was achieved. In addition to task force review, several steps were taken to ascertain and improve the model's validity.

Since all simulations with the model were initiated with 1972 data (the last year in which a complete set of the necessary data are available), the model's behavior between 1972 and 1976 was carefully scrutinized and compared to any actual numbers available for that time period. Adjustments were made to correct discrepancies that appeared. Data also were obtained to start the model at 1962, and the period 1962 to 1972 simulated and compared to historical data as a further check on model validity. A final check, a process called sensitivity analysis, revealed which assumptions had the greatest effect on model behavior and, therefore, where the greatest caution was needed in interpreting simulation results. Once the model had been validated and appeared to satisfactorily represent the real-world nursing system, the task force posed "what if?" questions about the policies and future trends and reviewed simulation results that analyzed those questions.

The model's relationships fall into four highly interrelated and interdependent pieces or sectors:

- Nursing education--representing the factors affecting the number of students of each major type of educational program and the graduation rates from these programs.
- Nursing employment--representing the factors affecting the number of nurses employed in each setting and various characteristics of employment in each setting, such as nurses' wages and nurses' roles.
- Demand--representing the health care provided in each sector of the health care delivery system, nursing needs, and nursing jobs available in each employment setting.
- Demographic--representing key demographic characteristics of the total population that impact on other sectors of the model, principally the demand sector.

An overview of some of the key relationships in the model is shown in figure 3. As shown in that diagram, the number of nursing students graduating from educational programs, along with other factors, affects the total supply of licensed nurses at each level of educational preparation. The number of graduates depends on the number of places in programs at each level and the number of applicants to those programs. Nursing employment in each setting depends on both the number of nursing jobs available and the number of nurses willing to take those jobs, (that is, on both the demand for and supply of nursing personnel). The health care provided in each sector of the health care system, nurses' wages and responsibilities, and other factors affect employers' desired staffing patterns and the number of nursing jobs available in each setting. Important influences on nurses' willingness to take available jobs include their wages, roles, and responsibilities, the match between qualifications of available nursing personnel and requirements of available jobs, the location of jobs relative to where available nurses live, and factors affecting the relative attractiveness of employment in different settings. Other important job influences are demographic characteristics such as nurses' age distribution, the fraction married, and childbearing patterns. The volume of health care delivered in each setting is affected by the size and age composition of the total population, care requirements for people in each age group, the financial and geographical accessibility of care, and the attitudes of people toward seeking care.

The model explicitly considers seven major employment settings, some of which have several subsettings. Hospitals were disaggregated into two subsettings: short-term hospitals and long-term hospitals (chronic disease, mental, TB). Hospital employment includes all nursing personnel concerned with inpatient care and administrative functions, but excludes personnel providing outpatient care (who are considered part of the ambulatory setting) and those teaching in hospital-based schools of nursing. Ambulatory care was disaggregated into three subsettings: physicians' offices and group practices, hospital outpatient departments and emergency rooms, and community health centers and mental health centers. Long-term care (primarily nursing homes) was treated as a major setting, as was home health care (including visiting nurse associations and nurses in public health agencies devoted to home care). Other settings included schools of nursing (faculty in programs educating nursing personnel); public health settings disaggregated into three subsettings: public health and voluntary agencies (excluding nurses providing home care), school health, and occupational health; and private duty and other (includes nurses working for hospitals on a temporary basis through central registries, in addition to the more traditional private duty employment). Employment reported for any one of these seven settings is the total employment in each of the subsettings.

The model also differentiates among nurses at various levels of preparation employed in each setting and disaggregates educational programs preparing personnel at those levels. Five separate levels of educational preparation are included in the model: LPN, associate degree, diploma, baccalaureate, and advanced.

The model also differentiates among the need for nursing personnel (the number that it would be desirable to employ to serve the population's health care needs), the demand for nursing personnel (positions made available by employers, given the population's actual utilization of and perceived need for health care and various constraints on those employers), and the number of nursing personnel actually employed (given positions available and nursing personnel available and willing to take those positions).

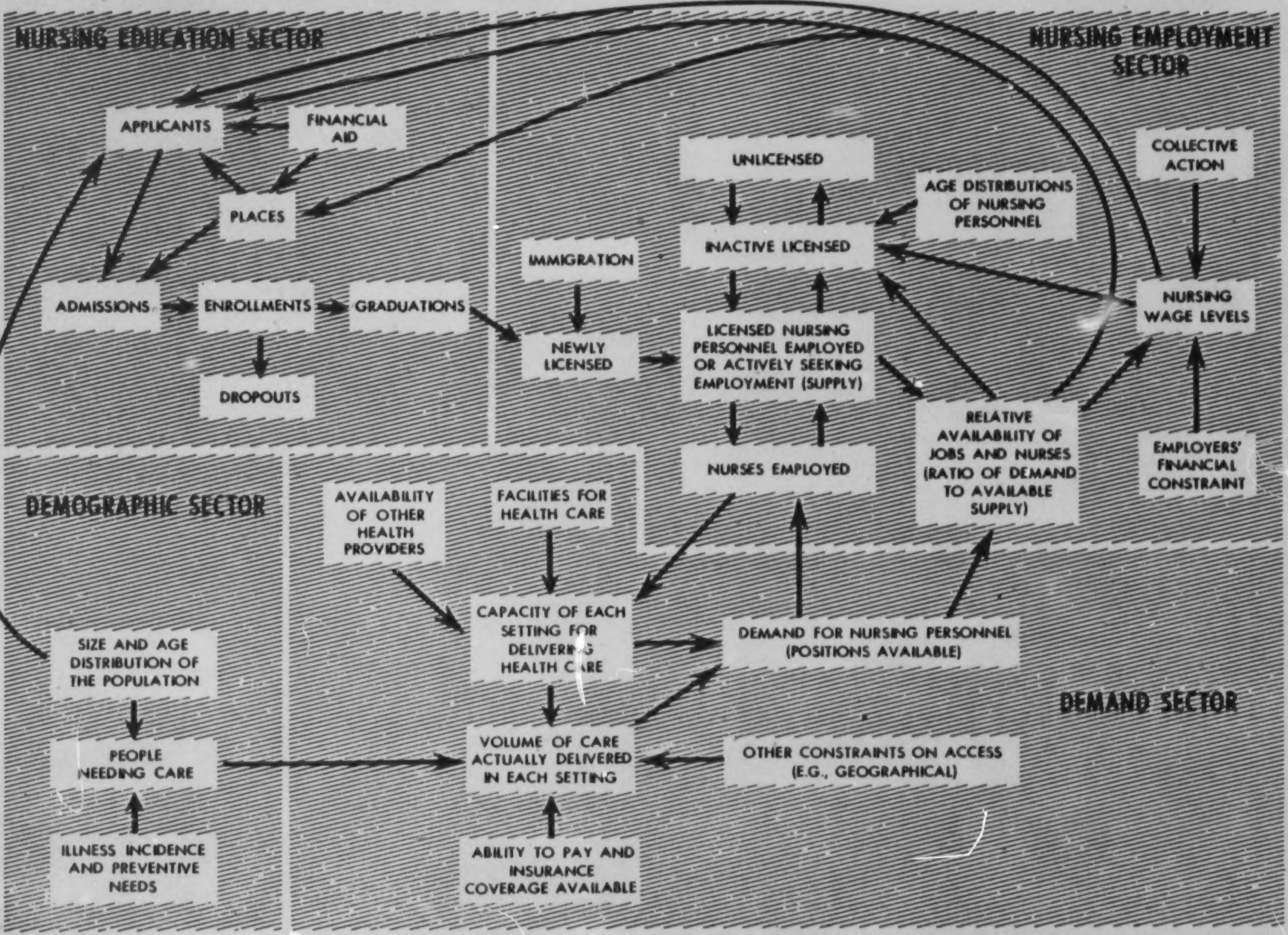
The model shown in figure 3 is different from other modeling efforts in nursing in that it includes factors affecting the supply of and demand for nursing personnel in the same framework. Other efforts project supply and requirements separately. In this model, the number of nursing personnel employers are willing to hire is a function of the number available, the financial situation of those employers (as affected by cost controls, adequacy of Medicare reimbursements, etc.), and patient care requirements for which each employer must provide. Similarly, the number of nursing personnel available at any time is determined not only by the number graduated in the past, but by the number of nurses willing to work as a function of prevailing wages, the breadth of responsibilities entailed in available jobs, and the number of jobs available relative to the number seeking jobs. This is in addition to the age distribution of nurses, their marital status, and career orientation.

A change either in the number of jobs or the number of personnel available will, in time, cause the other to change. In the model, a constant or declining number of jobs eventually will discourage people from entering nursing programs and dissuade inactive nurses from seeking employment, while an expanding number of jobs encourages growth in applications to nursing programs and higher activity rates. High vacancy rates will cause employers to eventually eliminate some unfilled jobs or fill them with lesser-skilled personnel, while an excess of nursing personnel will enable employers to deal with pressures to upgrade their nursing staffs. This interaction between supply and demand is designed to keep either one from getting too far out of line and to assure reasonable conformity to what would happen in the real-world nursing system.

Model Simulations

The model represents nursing and health care as they exist now and where they are likely to be in the next few years. Certain developments such as independent nursing practice were not built into the model's baseline assumptions, the set of things likely to happen in the future, because of uncertainties surrounding those developments. This does not preclude the model from dealing with these issues. Instead, the model

Figure 3.-- Overview of the National Nursing Model


NURSING EDUCATION SECTOR
APPLICANTS
FINANCIAL AID
PLACES
ADMISSIONS
ENROLLMENTS
GRADUATIONS
DROPOUTS
NURSING EMPLOYMENT SECTOR
UNLICENSED
AGE DISTRIBUTIONS OF NURSING PERSONNEL
COLLECTIVE ACTION
IMMIGRATION
INACTIVE LICENSED
NEWLY LICENSED
LICENSED NURSING PERSONNEL EMPLOYED OR ACTIVELY SEEKING EMPLOYMENT (SUPPLY)
NURSING WAGE LEVELS
RELATIVE AVAILABILITY OF JOBS AND NURSES (RATIO OF DEMAND TO AVAILABLE SUPPLY)
NURSES EMPLOYED
EMPLOYERS' FINANCIAL CONSTRAINT
DEMOGRAPHIC SECTOR
AVAILABILITY OF OTHER HEALTH PROVIDERS
FACILITIES FOR HEALTH CARE
CAPACITY OF EACH SETTING FOR DELIVERING HEALTH CARE
DEMAND FOR NURSING PERSONNEL (POSITIONS AVAILABLE)
SIZE AND AGE DISTRIBUTION OF THE POPULATION
DEMAND SECTOR
PEOPLE NEEDING CARE
VOLUME OF CARE ACTUALLY DELIVERED IN EACH SETTING
OTHER CONSTRAINTS ON ACCESS (E.G., GEOGRAPHICAL)
ILLNESS INCIDENCE AND PREVENTIVE NEEDS
ABILITY TO PAY AND INSURANCE COVERAGE AVAILABLE

Source: Analysis and Planning for Improved Distribution of Nursing Personnel and Services, A National Model of Supply, Demand, and Distribution, Final Report, WICHE, 1977.

is applied to developments by having it do a series of simulations in answer to "what if?" questions about those developments. Independent practice, for example, might be explored with a set of simulations that reflect different assumptions about the growth rate for this mode of practice and that reveal its impact on nursing requirements and on the supply of available health care. Many other developments, such as trends toward the involvement of nurses in comprehensive health care and preventive care and other new roles, can be considered in a similar manner.

Several sets of simulations were made with the initial one designated as the baseline. Simulation is a sequence of calculations performed with the model that describes how a system of related factors will behave over time. The calculations begin with a set of initial conditions that represent the status of the system at the beginning of the simulation in 1972. Initial conditions are provided for variables that can be counted or measured at any point in time, such as numbers of nurses, hospital census, and enrollments to nursing programs. The first set of calculations uses the initial conditions to arrive at the rates of change that will prevail during the first time period in the simulation (a month in the case of this model). Graduation rates are computed based on enrollments in programs, hiring rates are based on numbers of nursing personnel and jobs available, and turnover rates are based on personnel employed. Once the rates of change have been computed, the calculations proceed by updating the various quantities in the model to reflect the effect of those rates. Enrollments are decreased by the appropriate graduation rate and increased by an admission rate. Employment levels are increased by hiring rates and decreased by turnover. Other variables change in a similar manner. The updated values of these variables represent the status of the system at the end of the first time period. The simulation proceeds by calculating the next set of changes, again updating the model's variables, and so on, repeating the process until the end of the time period in which the simulation takes place.

Each simulation requires two things. One is the model itself, which contains the set of causal relationships used in all simulations. The model is represented as a set of equations in the DYNAMO simulation language, which are translated by DYNAMO into instructions that can be executed by a computer. The other requirement is a particular set of assumptions that corresponds to a given "what if?" question that policymakers want to examine with the model. A question such as "what would be the implications of increased aid to graduate education in nursing?" would be represented in the model by assumptions that higher levels of financial aid and numbers of places in graduate programs will prevail over the course of the simulation. The result of the simulation done with these assumptions would show the effect of increased aid on the total number of advanced program graduates and the number practicing in each employment setting. Many such questions can be examined in a similar manner. The critical thing to look for in the results of any of these simulations is not the absolute values of the model's variables over time, but their values relative to those displayed in the results of other simulations. Such comparisons will enable policymakers to discern the relative impact of various policies, programs, and other forces.

Baseline Simulation

The baseline simulation is based on a set of assumptions that involve no major changes in the health care system or the role of nursing. Historical trends are merely projected into the future for many variables; no change is assumed to take place in others. The baseline is not presented as a scenario of what is likely to occur. Rather, it is a simulation with a fairly neutral set of assumptions against which the other simulations can be compared. It is also a useful simulation in that one may, through careful examination of it, gain a better understanding of the behavior of the model. It is not important whether one agrees with all of the assumptions going into the baseline simulation. The model is a very flexible tool, and any of a broad range of assumptions can be substituted for those that have produced the baseline simulation.

Comparisons with the baseline simulation help the user to better understand how various changes affect the behavior of the model and, therefore, what effect those changes might have in the real-world system of forces affecting nursing. The assumptions going into the baseline simulation are the ones used in all simulations except for the few assumptions changed in each simulation to represent a particular "what if?" question. The assumptions play an important role in determining the results of a simulation, as long as an imbalance does not develop between the supply of and demand for nursing personnel at the various levels of preparation. If such an imbalance does occur, the model calculates the adaptations that are likely to occur in adjusting for that imbalance--wage changes, shifts in staffing patterns, increases or decreases in labor force participation, or changes in admissions to nursing programs.

The critical assumptions underlying the baseline simulation which is primarily a projection of historical trends are indicated below.

Model variable	Change assumed over course of baseline simulation (percentage)
Places in:	
LPN programs	-2
AD programs 1/	25
Diploma programs 1/	-50
Baccalaureate programs 1/	42
Advanced programs 1/	100
Breadth of responsibilities (autonomy, complexity of tasks) of nurses in:	
Hospitals	20
Ambulatory care	15
Fraction of hospitals with collective bargaining agreements 2/	500
Hospital beds:	
Short term	24
Long term	-58
Staffing level per patient in hospitals (includes RNs, LPNs, and aides)	22
RN fraction of nursing personnel in hospitals	26
RNs required for a given number of ambulatory visits	10
RNs employed in community health and mental health centers 1/	39
Physicians in office-based practice	88
Hospital outpatient and ER visits	100
Nursing home beds	20
Staffing level in nursing homes (includes RNs, LPNs, and aides)	15
RN fraction of nursing personnel in nursing homes	10
Demand for nurses in public health agencies (excluding home health)	67
Demand for nurses in occupational health	60
Demand for nurses in home care (includes public health nurses devoted to home care)	97
Demand for private duty nurses	-40
U.S. population	15

1/ Most of the change takes place in the first few years of the simulation followed by a leveling-off.

2/ Indicates an assumed increase in fraction of hospitals with collective bargaining agreements from 10 percent to 60 percent over the course of the simulation.

Detailed results from the baseline simulation are presented in table 2 (Appendix II). Following is a summary of the picture presented.

The picture is one of a good balance between supply and demand over the course of the entire simulation. The overall average vacancy rate for RN positions in all settings actually declines slightly from 8.4 percent in 1972 to 7.1 percent in 1990. While demand grows by 81 percent during those years, the number of available RNs increases more rapidly (83 percent), and vacancies are reduced even though many more positions had to be filled in 1990. This occurs despite the fact that the total number of licensed RNs grows by only 77 percent from 1972 to 1990, and there actually are slightly fewer licensed nurses in 1990 for each RN position that requires filling.

The source of the additional supply needed to produce the situation seen in 1990 is the larger fraction of the licensed pool that is employed or actively seeking employment. One reason for the growth in labor force participation is the shift in the age distribution of RNs, especially those with associate degrees, toward a larger proportion in the middle-age group in which participation increases as nurses tend to return to work after rearing children. Growth in the number of jobs available and the greater breadth of responsibilities associated with those jobs also helped to some extent to improve labor force participation. The result is a labor force participation rate (percent of licensed RNs employed) of 72.9 percent in 1990 as opposed to 70.5 percent in 1972. Not only did employment grow a bit more rapidly than demand or than the total licensed pool, the number not employed but actively seeking employment grew as well. The number in that category increased by 113 percent over the course of the simulation. Taking the two categories together, 80.1 percent of the licensed RNs either were employed or actively seeking employment in 1990 compared to 73.3 percent in 1972.

This roughly equal balance between supply and demand for RNs is not true of LPNs in the baseline simulation. The total number of LPNs grows by 73 percent, while the number employed grows by only 18 percent. This occurs despite the fact that admissions to and enrollments in LPN educational programs begin to decline as a surplus of people prepared at that level becomes evident. Admissions and enrollments fall 25 percent and 26 percent, respectively, below their 1972 levels by 1990. The principal reason a surplus is produced anyway is that the number graduating at 1972 rates quickly outstrips the growth in demand for LPNs. Between 1972 and 1976, the fraction employed drops from 78 percent to 67 percent, because additional jobs that could be filled by new graduates do not appear. The decline in this fraction continues for the rest of the simulation and eventually falls to 54 percent by 1990.

Changes in the number of licensed RNs at the different levels of preparation over the course of the baseline simulation are largely a result of changes in the size of educational programs. The number of nurses with associate degrees undergoes by far the largest increase (833 percent) because of the small base from which it started in 1972 and the very rapid growth that occurred in associate degree programs. The number of nurses with diploma-level preparation increases in the early years of the simulation, but declining places and enrollments in diploma programs eventually cause their number to begin decreasing. That happens when annual graduation rates fall below the rates at which diploma-prepared RNs (many of them in older age groups) are leaving nursing due to retirement, death, and other reasons. Therefore, only a 3-percent increase over the entire simulation occurs, and the number of RNs with diploma preparation drops from 79 percent to 46 percent of the RN population between 1972 and 1990. The number of nurses with baccalaureate and advanced preparation increases by substantial percentages as a result of the rapid growth in those programs and the small base from which both started in 1972. The number of baccalaureate nurses is increased by nurses with associate degree and diploma preparation returning for baccalaureate-level training. The number of nurses who already have basic preparation admitted to baccalaureate programs each year increases by 187 percent between 1972 and 1990, while basic baccalaureate (nonnurse) admissions increase by only 28 percent during that period.

There is a wide variation apparent in the degree to which the employment of RNs changes from 1972 to 1990 among employment settings. Hospitals and ambulatory care show the largest increases and have the greatest overall effect on the employment of nursing personnel. Employment of RNs in the home care setting increases at a rate near the overall average growth rate for employment of nursing personnel. Employment in long-term care (nursing homes) and public health, occupational health, and school nursing grows at a slower rate. Nursing school employment grows at a rate of only 15 percent between 1972-1990 because of the leveling-off or decline that occurs in most programs during that period. Employment of private duty nurses actually declines.

The growth in hospitals' demand for and employment of RNs is the result of several causes that are compounded together. Pressures to improve the quality of patient care, keep up with technological advances, care for patients with more intensive needs (greater acuity), meet demands arising in collective bargaining, and fulfill broader nursing responsibilities, all contribute to the 27-percent increase in the staffing levels (ratio of nursing staff to patients, including RNs, LPNs, and aides) by base year 1972. These factors, combined with the increased availability of RNs, also result in a shift in the relative size of the fractions of nursing personnel represented by RNs, LPNs, and aides, with a 39 percent increase in the RN fraction occurring by 1990. Most of this shift in staffing mix results from a sizable increase in the number of RNs employed in hospitals combined with a decrease in the number of people employed as aides. Shifts also occur in the fractions of hospital-employed RNs who are at different levels of preparation. Changes in the fractions at the associate degree and diploma levels largely reflect changes in the number available. Growth in the fractions with baccalaureate and advanced preparation also reflects greater availability to some extent, but also is indicative of a projected need for better prepared nurses to fill new nursing roles in hospitals, such as nurse clinician and nurse utilization reviewer. The 30-percent increase in short-term hospital census, due primarily to larger numbers of people in older age groups who are more likely to require hospitalization, is the final element contributing to the substantial growth in RNs employed in hospitals. The decline in long-term census has some effect in retarding this growth, but only very limited because of the comparatively small number of RNs employed in long-term hospitals.

Employment of RNs in ambulatory care grows even more rapidly over the course of the simulation, reaching a level in 1990 that is 115 percent above its 1972 level. One contributing factor to this rapid rate of growth is the number of nurses working as primary care nurse practitioners, which increases from 1,398 in 1972 to 22,400 in 1990. The remainder of the nurses working in the ambulatory setting are assumed to work as assistants to providers, including physicians, nurse practitioners, and physician associates. In the physician's office and group practice subsetting, demand for nurses working as assistants to providers is actually tied to the number of providers, principally physicians. Over the course of the baseline simulation the number of physicians in office-based practice is projected to increase by 87.6 percent. The availability of this many providers combined with increases in the size of the population, especially in older age groups, generates a significant increase in ambulatory visit rates. These higher visit rates also contribute to the growth in demand for nurses in the physician's office and group practice subsetting. In hospital outpatient departments and emergency rooms, a projected increase of 112 percent in visits between 1972 and 1990, based on recent and anticipated trends, creates most of the increased demand for RNs in that subsetting. A small increase in demand for RNs in community health centers and mental health centers and a shift toward a slightly greater fraction of the nursing personnel in ambulatory settings who are RNs, both make small additional contributions to the growth in RN employment.

The moderate rate of increase in the number of RNs employed in nursing homes is the result of a 21-percent increase in the average census in those facilities and a 9-percent increase in the RN fraction of nursing personnel employed in nursing homes. The increase in home care employment of RNs reflects a large anticipated expansion in the utilization of that type of service, as concern grows about the cost of institutionally based services. Overall employment growth of 41 percent in public health and related settings reflects 67-percent and 64-percent growth in the public health and occupational health settings, respectively, combined with practically no growth in the employment of school nurses (6 percent).

Increased Nurse Utilization and Responsibility

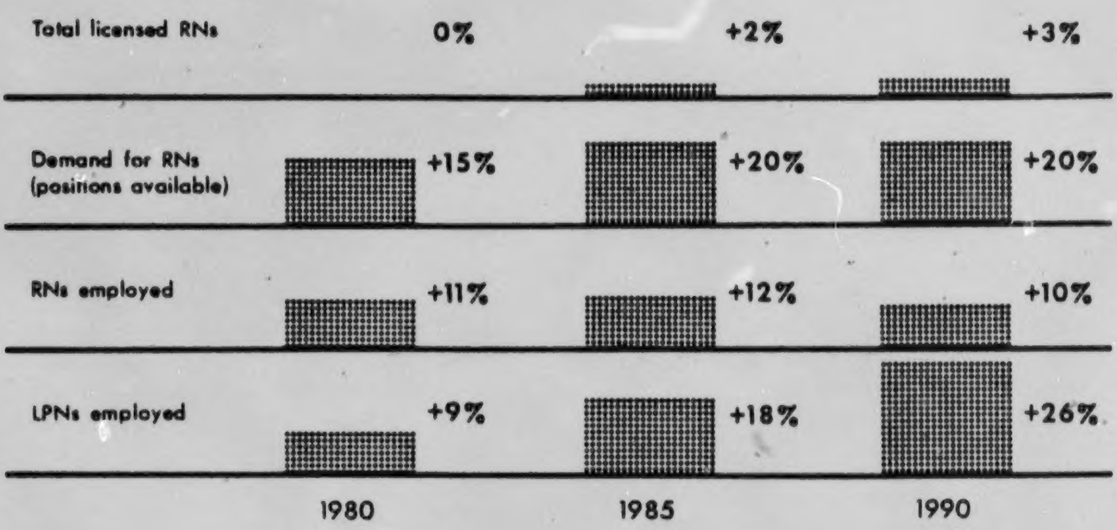
Figure 4 reflects changes noted in nursing demand and employment as a result of national health insurance or increased utilization and responsibility for nurses. The baseline simulation assumed no major changes would occur in health care delivery and that current trends would merely continue. The assumptions underlying the simulation of increased utilization and responsibility for nurses include the following: nurses working in the hospital and ambulatory settings will experience much greater growth in their responsibilities (autonomy, complexity of tasks) than in the baseline simulation; desired staffing levels in hospitals will grow more rapidly than in the baseline; the fraction of nursing personnel in hospitals and nursing homes that is composed of RNs grows more rapidly as well; and a bias exists in favor of RNs with baccalaureate and advanced preparation in hospitals, schools of nursing, public health, and home care, where nurses prepared at those levels are available.

The results of this simulation show that the additional demand created by the several trends toward more intensive utilization of nurses and broader responsibilities is so great that employment cannot keep up. Demand reaches a level in 1990 that is 20 percent above its corresponding baseline value, while employment is only 10 percent above its baseline value. As a result, the average vacancy rate across all settings goes from 7.1 percent at the end of the baseline simulation to 14.9 percent in this simulation. This occurs even though enrollment in nursing programs is significantly higher than in the baseline as a result of greater demand and higher wages. The total number of licensed RNs is 3 percent higher in 1990 than in the baseline. However, the number of nurses not employed, but actively seeking employment is 13 percent below the 1990 value of that variable in the baseline simulation, indicating that more nurses who want jobs are finding them. It is also easier in the simulation to fill available LPN positions created by the emphasis on higher staffing levels because of the large number of LPNs not employed. As a result, LPN employment in 1990 is 26 percent higher than its 1990 value in the baseline simulation.

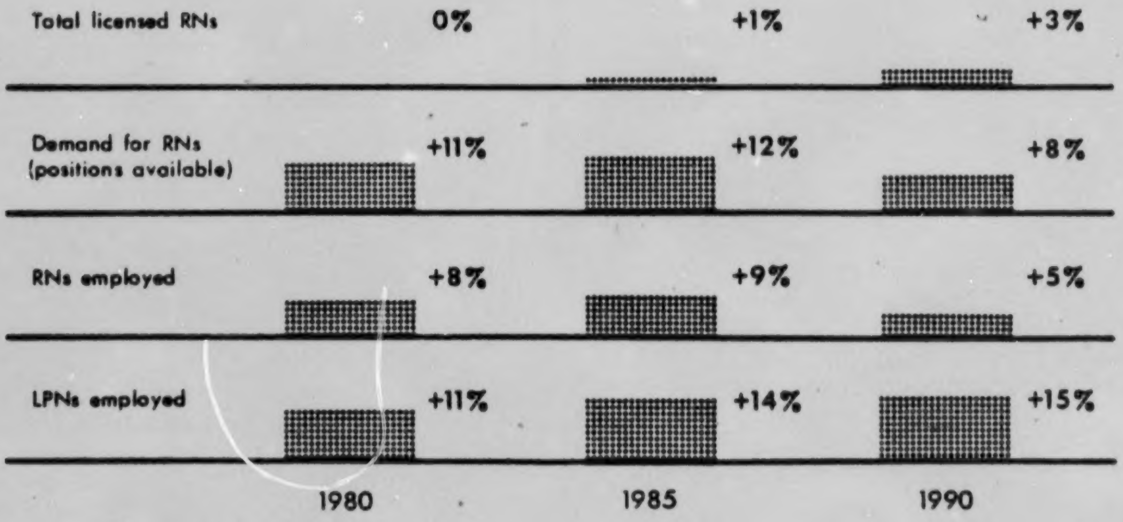
National Health Insurance Simulation

A simulation showing the effect of a national health insurance program has an obvious positive effect on nursing demand and employment. This program is assumed to have several effects on the health care system and on the demand for nursing personnel, including a moderate effect in

Figure 4.-- Results of simulations examining the effect of major health systems changes, 1980, 1985, and 1990 (percentages differences with respect to baseline simulation for that year)



Significant Increases in Nurse Utilization and Responsibilities



National Health Insurance

Source: Analysis and Planning for Improved Distribution of Nursing Personnel and Services, A National Model of Supply, Demand, and Distribution, Final Report, WICHE, 1977; and unpublished data from Pugh- Roberts Associates, Inc.

increasing the number of patients utilizing hospitals and nursing homes; and a much greater impact on the ambulatory and home care settings, with significant increases in utilization of care and in the demand for RNs occurring in both of those settings over the course of the simulation. The simulation also includes growth in hospital and nursing home beds at a rate somewhat greater than in the baseline simulation in order to accommodate the additional utilization stimulated by the insurance program.

The results reveal employment levels that are higher than those in the baseline simulation, an obvious result of the increased demand generated by the insurance program. By the end of the simulation, hospital census is 11 percent above its baseline 1990 level, and nursing home census is 17 percent higher than its baseline value. The number of people receiving ambulatory care and home care also is considerably greater. The consequence of the higher health care demand level for nursing is a level of nursing employment 5 percent above the baseline level and a demand for nurses (available positions) that exceeds the corresponding value in the baseline simulation for that year by 8 percent. Demand for nurses is so strong as a result of the insurance program that enrollments in education programs respond by reaching higher levels than those achieved in the baseline simulation. Due to higher enrollments, the total number of RNs is 3 percent higher than that in the baseline by the end of the simulation. Strong demand also results in a smaller number of RNs not employed, but actively seeking employment, since more jobs are available.

The greatest impact of insurance programs on employment is in settings that are least often covered by health insurance now--ambulatory care and home health care. Hospital and nursing home employment settings experience much smaller increases relative to the baseline simulation because of the smaller marginal effect health insurance programs have on utilization in those settings, given the existing prevalence of coverage for hospital and nursing home services. Nursing school faculty employment is somewhat higher than it was in the baseline simulation because of the higher enrollments. Public health and related settings and private duty nursing essentially are unaffected by the insurance program in the form assumed for this simulation.

The "State Model" Approach to Requirements - WICHE

The State Model was a third approach used to determine nursing requirements. It was undertaken by WICHE under a contract with the Division of Nursing, initiated in March 1975. It was the most difficult of all the activities undertaken by WICHE and called for development of a model to be used by State and local planners to project nursing manpower resources and requirements 5 years into the future. As a planning tool, the model allows for variability in health service requirements among the States and makes use of the input of State and local representative advisory groups in arriving at requirements for nursing personnel. The State Model provides an analytical framework and an orderly process for States to use in estimating their requirements. It is responsive to the many factors that influence the utilization of nurses and the effect of new roles for nursing on requirements for nurses, such as changes in the delivery of health care services. Field development of the State Model occurred during the first 18 months of the project. WICHE was granted a 1-year extension of the project on September 16, 1976, to continue application of the State Model process to make State-by-State estimates of nursing requirements through 1982 from a national basis in order to assist the Division of Nursing in activities relating to the 1979 report to Congress on the Nurse Training Act.

Panel of Expert Consultants

One of the activities of WICHE during the extension period was the convening of a Panel of Expert Consultants. Since the State Model relies heavily on a number of assumptions and decisions made by experts, the Panel was a resource for producing State-by-State estimates of nursing manpower requirements 5 years into the future. Selection of Panel members was made on the basis of expertise in the areas of nursing service, nursing education, higher education, hospital, public health, health care administration, health planning, operations research, and economics. The Panel included individuals who had served on WICHE's National Model and State Model Task Forces during the initial 18-month contract, who represented professional nursing and other health related organizations, and who provided representation from various ethnic minorities and geographic areas of the country.

The charge to the Panel of Expert Consultants was to develop assumptions, estimates, and criteria that are relevant to project requirements for nursing for the 5-year period ending 1982. The Panel was asked to provide expert judgment on the most cost effective ratios and types of nursing personnel, and on the requirements for nurses with abilities acquired through various types of educational programs. While recognizing the interrelationship between nursing supply and requirements, the Panel did not project nursing supply, as this task was beyond the scope of its charge.

The task of the Panel of Expert Consultants can be likened to the work of the Surgeon General's Consultant Group on Nursing, which was completed in 1963 (PHS, 1963). The report and recommendations of the Consultant Group served as the basis for the extensive program of Federal assistance for nurse training. In developing its projections of the number of nurses needed for the seventies, the Consultant Group drew upon its judgment to determine criteria for the educational preparation required for various nursing positions. The method and estimates have been endorsed by other groups in the intervening years and have been updated as necessary.

However, changes that have occurred in the organization and delivery of health care services since 1963 and changes that have taken place in nursing education and practice have necessitated a new approach to the assessment of nursing requirements. Also, unlike the Consultant Group, the Panel of Expert Consultants estimated State-by-State nursing requirements as well as national requirements.

The Panel began its work in January 1977, and convened for five 3-day sessions, the last being held in July 1977. To facilitate its work, appropriate documents on health planning and nursing were provided by the Division of Nursing and project staff as background material. Additionally, access was provided to a computerized data base, assembled in the course of the broader WICHE project, Analysis and Planning for Improved Distribution of Nursing Personnel and Services, representing the most complete information about nursing manpower ever assembled. Discussions focused on the total context of the health care scene and changes in nursing education and practice. The Panel addressed issues concerning the delivery of health care services, nurse utilization in the delivery of health care services, and directions for nursing.

Projections of Requirements

The State Model provides an analytical framework for projecting nursing supply and requirements 1 to 5 years into the future. The process consists of five major steps that identify the key variables and decision points the user must address in making the requirements projections. These steps include:

Differentiating the client population,

Assessing the health care needs of each population grouping,

Formulating health care goals and priorities for each population grouping,

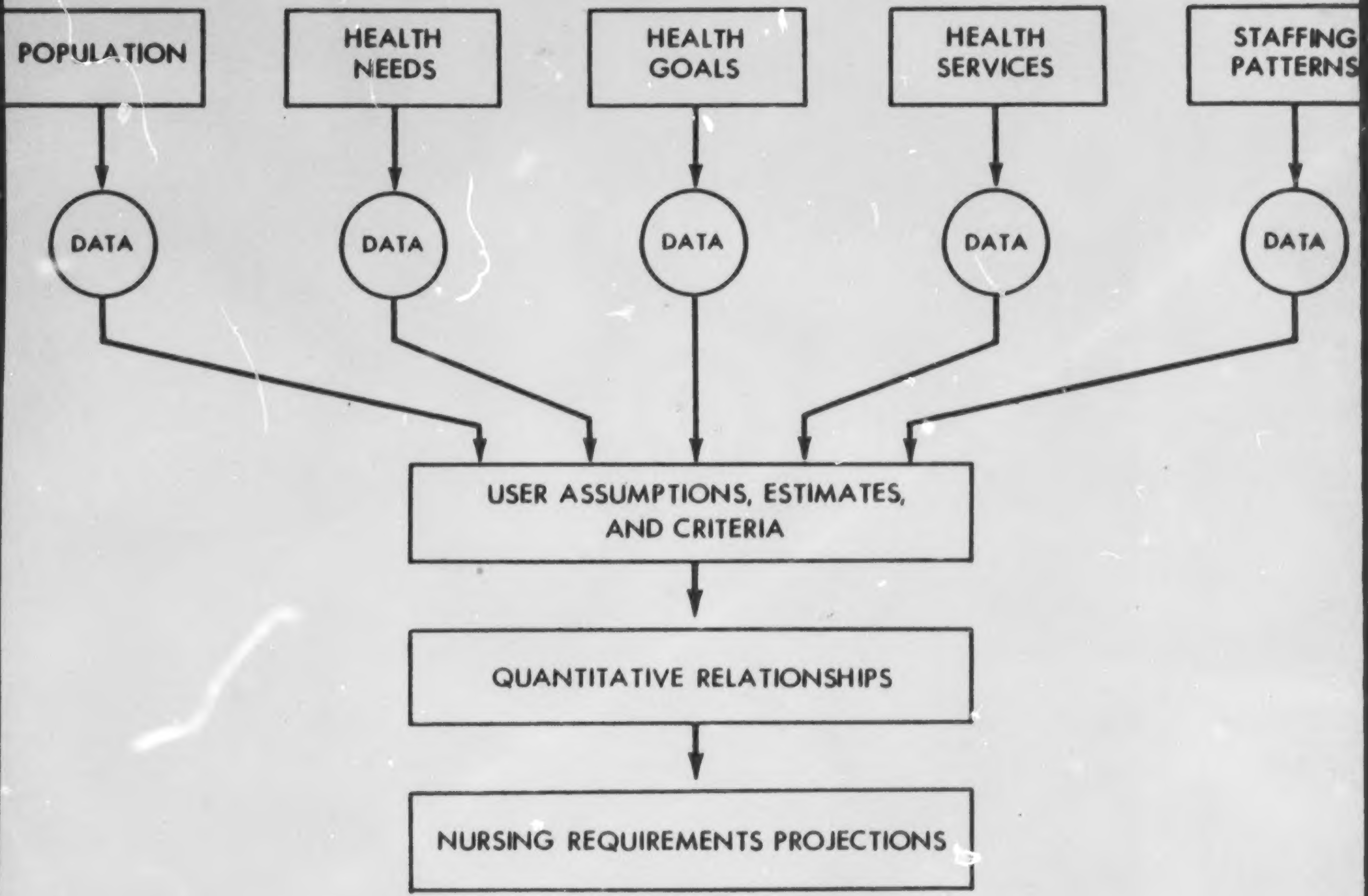
Estimating health program and service requirements, and

Estimating appropriate staffing patterns.

Figure 5 provides an overview of the State Model nursing requirements projection scheme.

In using the State Model, the Panel made assumptions with respect to the population, health care needs, and health care goals. Estimates of required services were projected on the basis of the Panel's underlying assumptions. Criteria for staffing patterns for nursing personnel and

Figure 5.-- Overview of nursing requirements projections scheme


POPULATION
HEALTH NEEDS
HEALTH GOALS
HEALTH SERVICES
STAFFING PATTERNS
DATA
DATA
DATA
DATA
DATA
USER ASSUMPTIONS, ESTIMATES, AND CRITERIA
QUANTITATIVE RELATIONSHIPS
NURSING REQUIREMENTS PROJECTIONS

Source: Lum and Leonhard, Analysis and Planning for Improved Distribution of Nursing Personnel and Services, Panel of Expert Consultants' Final Report, Western Interstate Commission for Higher Education, 1977. In press.

educational preparation of registered nurses to meet required services were adopted. Quantitative relationships were developed and used to facilitate the decisionmaking process as a result of the Panel's assumptions, estimates, and criteria. These relationships were formulated with respect to the population, health services, and nurse staffing considerations.

For Example:

$$\text{Number of Patients} = \text{population} \times \frac{\text{beds}}{\text{population}} \times \text{occupancy rate}$$

$$\text{Number of FTE* RNs Needed} = \text{number of patients} \times \text{RN staffing ratio}$$

$$\text{Number of FTE* LPNs Needed} = \text{number of FTE* RNs needed} \times \frac{\text{LPN}}{\text{RN}}$$

$$\text{Number of FTE* Aides Needed} = \text{number of FTE* RNs needed} \times \frac{\text{Aide}}{\text{RN}}$$

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*FTE = Full-time equivalent

The Panel made several iterations of its projections until a set of assumptions, estimates, and criteria was reached that would meet the level of care they set as their goal. The goal was to arrive at projected requirements that would enhance access to nursing services, be cost effective, and provide quality nursing care. The Panel's assumptions, estimates, and criteria were based on current practice and accepted standards where these existed. In less defined areas, the Panel used its collective expertise to make its projections. The Panel applied its staffing ratios and educational criteria to total U.S. data in projecting nursing requirements nationally, in addition to the State requirements.

In recognition of local and regional geographic differences and institutional variables that have an impact on staffing requirements, a range of staffing levels were proposed.

The Panel's projections were made in terms of full-time equivalent (FTE) positions. FTEs are based on all full-time positions plus one-half of all part-time positions. Data utilized by the Panel in making its projections were derived from a variety of sources.

Specifically, the Panel of Expert Consultants focused on the following work plan for its sessions. At the first meeting, the Panel was provided general background information on the total Analysis and Planning Project and a specific overview of the State Model process. Decision points, requiring advice and counsel of the Panel, were highlighted. These centered around the major steps outlined in the State Model for making requirements projections cited previously.

Data displays of the characteristics of the client population on a national and State-by-State basis were presented, and the Panel made preliminary decisions regarding classification of the population groupings according to selected demographic characteristics that had implications for health care and nursing services.

At its second meeting, the Panel continued its discussion on how nursing requirements of individual States may be differentially affected by the demographic characteristics and health status of the population. Trends in inpatient hospital services were reviewed with regard to their implication for the delivery of health care services. Criteria and standards for nurse staffing were analyzed. The Panel adopted criteria and assumptions and made its initial estimates on staffing and educational preparation for registered nurses in institutional settings.

Criteria and Assumptions

In arriving at its criteria and assumptions the Panel went through a series of decision points.

1. The first decision point in the requirements planning process dealt with the population to be served. Data on key demographic variables, such as age, race/ethnicity, sex, income, educational attainment, and occupations that have impact and implications for health care, were considered. The decision point related to how the population should be differentiated so that its health needs might be better assessed. Earlier discussions on the health status of the population gave examples of how these demographic characteristics are associated with particular health needs. A major purpose in reviewing these data was to identify what health needs are unmet and what specific population subgroups are especially affected. In assessing the health needs of the population, the Panel examined differentiating characteristics of the client population from profile data made available by the data base, and related these to health needs for selected demographic groupings in the population.

2. Closely allied to differentiating the population is the assessment of the health status of the population in terms of quantitative health status indicators. These included a variety of possible indicators, including morbidity, mortality, and natality statistics.

3. The next decision point related to the identification of a specific set of health goals, or, if general health goals already existed, the adoption of these into a form more meaningful for planning purposes. These goals provide the

basis upon which subsequent decisions about health services and nursing utilization will be made. Very limited quantitative data are available at this point. However, national priorities established by Federal legislation provide relevant background material. Besides providing for more focused planning and facilitating program accountability, goal-oriented planning affords feasible opportunity for consumer input into the planning process. The Panel emphasized a wellness, preventive orientation in health planning and assumed an increase in ambulatory outpatient and community-based services. The Panel also projected an increase in nursing services to the elderly.

4. Once health goals had been determined, the question of programmatic thrusts had to be considered. The most immediate question related to how health programs might be conceptualized. Health programs may be viewed in terms of inpatient, ambulatory, emergency, and outreach services, or in terms of prevention and detection, diagnosis and treatment, habilitation and rehabilitation, maintenance or support services. The emphasis to be given to particular health programs was addressed next.

In conceptualizing health programs and mix of nursing services, the Panel established the following categories of health services. Inpatient services were differentiated and grouped according to selected criteria which the Panel agreed would have an impact on differential staffing patterns. Hospitals were classified as being long term versus short term. Within the long term hospitals, the Panel included two major subcategories--psychiatric hospitals and all other long term hospitals. Short term hospitals were subdivided into small (fewer than 100 beds), large teaching (over 400 beds), and all other hospitals. Specific units specified within the appropriate hospitals included: general medical-surgical (including maternity units), critical care, self-care, extended care, rehabilitation, psychiatric, and newborn units.

In making projections for inpatient services (hospitals), the Panel assumed the bed-to-population ratio would stabilize at the current ratios. Occupancy rates based upon actual 1975 figures were used for projecting requirements to 1982. The Panel projected the trend toward a stabilized utilization of hospital beds to be brought about by PSRO reviews, the use of HMOs, the limitation of hospital costs by Federal legislation, and by Certificates of Need.

Other hospital services where nursing care is provided included: operating rooms (surgical operations), emergency services (emergency visits), and outpatient clinics (visits). Nursing homes were subdivided into two categories -- nursing care homes and personal care homes with nursing. Additional categories where services are provided included physicians' offices, private duty, and other health related organizations.

Nursing services provided within the public health-community health sector were viewed from five areas. These included home visiting for home health care and/or general public health, clinics, school health, occupational health, and other services such as regulatory and licensure programs.

5. The final set of decisions dealt with the numbers and kinds of nursing personnel required to provide health services. In the nurse staffing area, attention was given to the crucial issues facing the nursing community with regard to the educational preparation of registered nurses and expanded roles for nurses. In projecting nursing requirements, the Panel made recommendations with regard to: (1) the overall staffing levels required, (2) the desired mix among RNs, LPNs, and aides, and (3) the desired mix of RNs at the associate degree/diploma (AD/DIP), baccalaureate, and advanced levels of preparation. The roles of nurse practitioners and clinical nurse specialists were also considered. The set of criteria developed appears as figure 6 and the resultant projections requirements are shown in figure 7 and table 3 in Appendix II.

Figure 6.—Panel of expert consultants criteria for nurse staffing and RN educational preparation

Field of employment	Criteria for staffing (in terms of FTE nursing personnel)						Criteria for RN educational preparation (in percentage of nurses)			
	Lower Bound			Upper Bound						
INPATIENT SERVICES	RNs (per 100 patients)	LPNs	Aides	RNs (per 100 patients)	LPNs	Aides	Doct.	Master's	Bacc.	AD/Dip.
General medical-surgical units	49.0	12.0	12.0	56.5	12.0	12.0			50	50
Rehabilitation units	49.0	12.0	12.0	56.5	12.0	12.0			50	50
Newborn units	49.0	12.0	12.0	56.5	12.0	12.0			20	80
Critical care units	200.0	0.0	0.0	250.0	0.0	0.0			50	50
Extended care units	20.0	20.0	20.0	30.0	20.0	20.0			50	50
Long-term hospitals (psychiatric)	13.0	10.0	30.0	22.0	10.0	30.0			50	50
Psychiatric units in all short-term hospitals	49.0	0.0	24.0	56.5	0.0	24.0			50	50
OTHER HOSPITAL SERVICES										
Operating room	1.5 RNs per 1,000 operations (10 RNs/0 LPNs/3 aides)			1.8 RNs per 1,000 operations (10 RNs/0 LPNs/2 aides)						
Emergency room	.22 RNs per 1,000 visits (10 RNs/10 LPNs/10 aides)			.44 RNs per 1,000 visits (10 RNs/10 LPNs/5 aides)					50	50
Outpatient clinics	.11 RNs per 1,000 visits (10 RNs/10 LPNs/10 aides			.23 RNs per 1,000 visits (10 RNs/10 LPNs/5 aides)				10	80	10
NURSING HOMES										
Nursing care homes	9.0	23.0	23.0	20.0	40.0	40.0			50	50
Personal care homes with nursing	5.0	10.0	20.0	5.0	10.0	20.0			50	50

Figure 6.--Panel of expert consultants criteria for nurse staffing and RN educational preparation--Continued

Field of employment	Criteria for staffing (in terms of FTE nursing personnel) Lower Bound	 Upper Bound	Criteria for RN educational preparation (in percentage of nurses) Doct.	 Master's	 Bacc.	 AD/Dip.
RNs IN PHYSICIANS' OFFICES	2.0 RNs per 10 MDs (10 RNs/3 LPNs/0 aides)	2.2 RNs per 10 MDs (10 RNs/2 LPNs/0 aides)		25	25	50
COMMUNITY HEALTH						
Home health care	(10 RNs/1.4 LPNs/2 aides)	(10 RNs/1.4 LPNs/2 aides)		[1]10	75	15
General public health	(10 RNs/1.4 LPNs/2 aides)	(10 RNs/1.4 LPNs/2 aides)		[1]10	90	
Clinic	(10 RNs/1 LPN/2 aides)	(10 RNs/1 LPN/2 aides)		[1]10	75	15
School health	Detailed criteria based on type of clients served and time/visits necessary to serve.			[1]10	90	
Occupational health				[1]10	90	
Correctional institutions				[1]10	90	
Other				[1]10	90	
NURSE PRACTITIONERS						
Hospital ambulatory care	10 percent of hospital ambulatory care RNs	13 percent of hospital ambulatory care RNs		Currently certificate and/or master's preparation exist.		
Physicians offices	15 percent of RNs in physicians' offices	25 percent of RNs in physicians' offices				
Public health	10 percent of RNs in public health	15 of RNs in public health				

Figure 6.—Panel of expert consultants criteria for nurse staffing and RN educational preparation—Continued

Field of employment	Criteria for staffing (in terms of FTE nursing personnel)		Criteria for RN educational preparation (in percentage of nurses)			
	Lower Bound (RNs per 100 patients)	Upper Bound (RNs per 100 patients)				
CLINICAL SPECIALISTS						
Large, teaching (over 400 beds)	3.0	5.0	The educational preparation for all clinical specialists is at the graduate level.			
Small (under 100 beds), and all long-term hospitals	2.0	4.0	Projections were made for 100 percent master's preparation.			
All other short-term hospitals	2.0	4.0				
Nursing care homes	.5	1.0				
Personal care home with nursing	0.2	0.3				
Hospital ambulatory care	1 per 20 DCC RNs	1 per 20 DCC RNs				
Community health	1 per 20 DCC RNs	1 per 20 DCC RNs				
RNS IN ADMINISTRATIVE POSITIONS[2]			Doct.	Master's	Bacc.	AD/Dip.
Executive/principal nurse administrator [3]						
All hospitals	1 Director of nursing/insitution		5	95		
Large, teaching (over 400 beds)	2-3 Assistants and/or associate directors/institution		5	95		
All other short-term hospitals	1-2 Assistants and/or associate directors/institution		5	95		
Nursing care homes	1 Director of nursing/institution		5	95		
Personal care homes with nursing	1 Director of nursing/institution		5	95		
Community health nursing	1 Director/agency		5	95		
Mid-level nurse administrator/manager [4]						
All hospitals	1 Head nurse per 30 patients			25	75	
All hospitals	1 Supervisor per 100 patients			25	75	
Nursing care homes	1 per 10 DCC RNs			25	75	
Personal care homes with nursing	0.5 per 10 DCC RNs			25	75	
Community health nursing	1 per 10 DCC RNs			25	75	

Figure 6.—Panel of expert consultants criteria for nurse staffing and RN educational preparation—Continued

Field of employment	Criteria for staffing (in terms of FTE nursing personnel)		Criteria for RN educational preparation (in percentage of nurses)			
	Lower Bound (RNs per 100 patients)	Upper Bound (RNs per 100 patients)	Doct.	Master's	Bacc.	AD/Dip.
INSERVICE INSTRUCTORS						
Short-term, large, teaching hospitals	3 RNs per institution	6 RNs per institution		100		
Nursing homes and all other hospitals	0.5 RNs per institution	1 RN per institution		100		
Community health nursing	0.5 RNs per agency	1 RN per agency		100		
RESEARCHERS AND CONSULTANTS	0.1 per 10 DCC RNs	0.3 per 10 DCC RNs	50	50		
SCHOOLS OF NURSING						
Administration	1 per school and 1 per program (first 200 students), and 1 per each additional 200 students. 5					
Doctoral, masters, baccalaureate			100			
Associate, diploma			25	75		
LPN				100		
Faculty						
Doctorate	1 RN per 6 students	1 RN per 4 students	100			
Master's	1 RN per 6 students	1 RN per 4 students	75	25		
Baccalaureate	1 RN per 8 students	1 RN per 6 students	20	80		
Associate	1 RN per 10 students	1 RN per 8 students	10	90		
Diploma	1 RN per 10 students	1 RN per 8 students	10	90		
LPN	1 RN per 10 students	1 RN per 8 students		60	40	
PRIVATE DUTY	1 RN per 10,000 population	0.9 RN per 10,000 population			20	80
HEALTH RELATED ORGANIZATIONS	0.4 RN per 10,000 population	0.5 RN per 10,000 population	10	90		

Figure 6.—Panel of expert consultants criteria for nurse staffing and RN educational preparation—Continued

1/ The Panel proposed that 10 percent of the community health nurses be prepared at the graduate level but did not specify the percentage breakout between master's and doctoral levels. Numerical projections are based on master's level preparation only because of the nature of the projection method used.

2/ The same criteria holds for both the lower and upper bound projections for RNs in administrative positions.

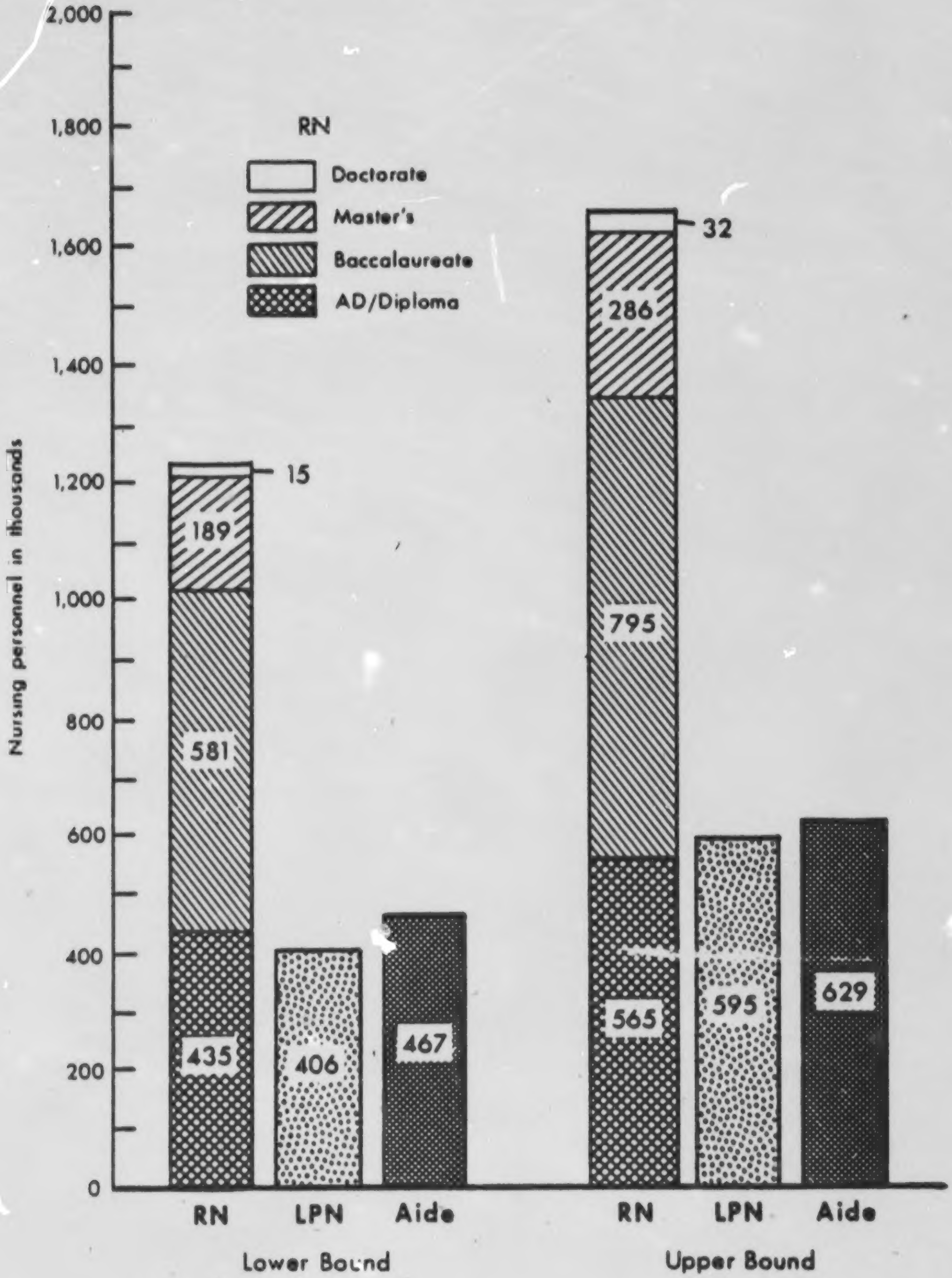
3/ For the purpose of the projections, this was modified to three administrators per large, teaching, short-term hospital; two administrators per "All Other" short-term hospital; and one administrator for each of the remaining institutions (and agencies).

4/ For the purpose of the projections, this was modified to two administrators per 10 direct client care RNs in large, teaching, short-term hospitals; 1.6 administrators per 10 direct client care RNs in "All Other" short-term hospitals; and one administrator per 10 DCC RNs elsewhere.

5/ Because of the nature of the mapping of the existing data, the projections for School of Nursing Administrators were made on the following basis; three administrators per baccalaureate program, and one for each other program.

Source: Lum and Leonhard, Analysis and Planning for Improved Distribution of Nursing Personnel and Services, Panel of Expert Consultants' Final Report, Western Interstate Commission for Higher Education, 1977. In press.

Figure 7.-- Projected requirements for full-time equivalent nursing personnel by educational preparation, 1982



Source: Lum and Leonhard, Analysis and Planning for Improved Distribution of Nursing Personnel and Services, Panel of Expert Consultants' Final Report, WICHE, 1977. In press.

Chapter 2

ANTICIPATED SUPPLY IN THE NATION AS A WHOLE

To study the effect of requirements on the needs of the country for nursing personnel requires the determination of the anticipated supply (both registered and licensed practical nurses) that might be available for employment at a particular point in time. Since both the registered nurse and licensed practical nurse groups are predominately composed of women, the supply that might be available for employment strongly depends not only on those educated and licensed to practice but also on those willing to practice. As reported subsequently in the chapter, Factors Affecting Supply and Requirements, a proportion of the licensed population is not employed in nursing. For the most part, this group consists of nurses who had voluntarily withdrawn from the work force, primarily because of retirement or family considerations. While a number of these nurses anticipate returning to active practice and do return at some future date, when determinations are made of the supply one cannot consider these individuals as available for practice at the particular time for which the determinations are made.

In June 1974, the Division of Nursing entered into a contract with the Research Triangle Institute to investigate and develop a methodological approach to the determination and projection of the registered nurse supply in the United States as a whole, using already existent data sources. The methodology developed related the determination of the supply to the number of nurses licensed to practice and the number who might be active at any time (Jones, et al., 1976). The latter group represented the anticipated supply. Following the completion of that study, the Manpower Analysis and Resources Branch of the Division of Nursing undertook an intensive review of this and other methodologies and, for the initial effort, developed two approaches to the determination of registered and licensed practical nurse supply.

Supply Models

One approach to the estimation of the supply, the national supply model, follows the general design identified in the Research Triangle Institute study. Modifications were made in the application of existent data to the model, in refinement of the initial data used, and in the concept of loss of licenses identified in the Research Triangle Institute study. In addition, the necessity to develop projections of the supply of registered nurses according to educational preparation and the supply within each State, as well as the determination of the supply as it would relate to full-time equivalents, required the development of additional techniques and the application of additional data.

The other approach, identified as the State supply model, was developed to determine the distribution of nursing personnel among the States and the trends in the distribution of registered nurses according to educational preparation. The determination of the full-time equivalents was the result of an amalgamation of data outputs from the two models.

The two approaches were not devised to present projections based on alternative methodologies, but rather to enable the incorporation in the projection methodology of the various levels of supply projections necessary to appropriately determine the nursing resources that might be available in the future. Ideally, the approach should encompass the total scope of projections within one framework. Variations in the approaches to supply projections are based solely on techniques and application of data rather than additionally on varying assumptions and "policy decisions," as were the "requirements" models described previously. Both supply models were used to generate alternate projections based on the same variations in assumptions about the graduations from nursing educational programs. The primary reason for the use of two approaches here was the lack of certain specific data inputs necessary to amalgamate the two. With respect to the registered nurse components of the supply estimates, it is anticipated that when final data are available from the national sample survey, many of these data gaps will be filled. The study will also provide data necessary to make further refinements which would take account of certain factors not separately identified in either approach. No such study is being conducted of licensed practical nurses. However, since a large segment of the missing data for registered nurses is related to changes in the educational preparation of those already part of the registered nurse population, an area which does not affect the licensed practical nurse projections, it is expected that more detailed examination of available data on the LPNs might be of help in refining the projection methodology.

Both models are initiated by data on the distribution of nurses from the latest complete data source on the group. For registered nurses, the data used were from the 1972 Inventory of Registered Nurses and, for licensed practical nurses, the data used were taken from the 1974 Inventory of Licensed Practical Nurses. These data need only be known for the beginning of the year at which the model is to be initiated, since subsequent projections are based on changes in the initial group and new additions to the licensed population. Both models project the total licensed population and the segment of this population that would constitute the supply for that time.

Changes in the number of nurses in the licensed population in the country are the result of new licenses issued to nurses never before licensed; loss of nurses due to mortality derived from life tables for white females; the reinstatement of lapsed licenses; and licenses lapsed for reasons other than mortality. Since no specific data presently are available on reinstated and lapsed licenses, these data were determined from net losses (or net gains) of nurses during a given year. The determination of those in the active supply was based on activity rates (the proportion of the total licensed population who would be employed in nursing).

Studies have shown that age is a good determinant of whether or not a nurse might be employed (Roth, Walden, 1974; Jones, et al., 1976; Roth, Schmittling, 1977; Follow-up to 1972 Inventory of Registered Nurses Study, Division of Nursing, 1977). The national supply model takes this into account by treating the nurse population on an age-specific basis with the initial distribution obtained from the 1972 Inventory of Registered Nurses and the 1974 Inventory of Licensed Practical Nurses. New licensees were made age specific with data on the age distribution of newly licensed nurses, according to basic educational preparation for registered nurses (Nash, 1975).

The net loss of the licensed population in the national supply model was derived from annual licensure data reported to the American Nurses' Association by the State Boards of Nursing. Since nurses may hold licenses in more than one State, to determine the proportion of lost licenses that represented losses in the nurse population, "duplication factors" were initially developed through the determination of net losses of nurses from the 1966 and 1972 Inventories of Registered Nurses and the 1967 and 1974 Inventories of Licensed Practical Nurses in comparison with net loss in licenses during that period. The net loss of nurses was made age specific through the development of net loss or net gain rates for each age from these inventories.

The determination of the number of nurses who would constitute the active supply was based on age-specific activity rates, obtained from the Inventories, for nurses who were in the continuing nurse population each year. For the initial year of entry of new licenses and those representing reinstatements, the activity rate used was the one obtained in the study of newly licensed nurses (Nash, 1975).

Annual licensure data were available at the time the projections were made through calendar year 1975. The number of new licenses each year after that date was estimated as a function of the projections of graduations. Net losses in licenses were derived from trends in net loss rates in the period between 1966 and 1975, and total licenses in existence. To obtain the total licenses in existence, projections of additional licenses each year and the net loss of those in existence in the previous year were taken into account. Additional licenses included projections of new licenses and of those licenses issued to nurses through endorsement of another State's license.

Distribution of Nurses by Educational Preparation

While data on the distribution of registered nurses according to highest educational preparation were available from the 1972 Inventory and data on the number of registered nurses who graduate from post-RN educational programs were available from the annual surveys made by the National League for Nursing, no information existed at the time these models were developed on the age distribution of those graduating. Thus, educational preparation of registered nurses could not be derived from the national supply model. The distribution of the anticipated supply of registered nurses according to highest educational preparation was obtained from the State supply model.

The State supply model is designed to project the number of licensed and employed licensed registered or practical nurses for each State and the District of Columbia, according to the highest level of educational preparation for registered nurses. The individual State projections for a given year are then summarized to determine the corresponding national totals for that year.

The model for any given year takes into account on a State-by-State basis the following factors: the number of licensed registered nurses employed in the State or, if not employed in nursing, living in the State at the beginning of the year, by level of highest educational preparation; the number of new licenses granted by the State during that year; the number of registered nurses who upgrade their educational levels, i.e., change from one level of highest educational preparation to another; the rate at which licensed nurses migrate out of and into the State; the mortality rate; and the loss-gain rate, which describes the percentage of licensed nurses who, for any reason other than mortality, lost their licenses. The result of the calculation is the number of licensed nurses in the State, by level of highest educational preparation, at the end of that year. This result, in turn, is used for calculations pertinent to the succeeding year.

The first of the factors indicated above needs only to be made available to the model at the beginning of the year at which the model is to be initiated, while the remaining factors are annually defined. Thus, as was true for the national supply model, the initial data for the model came from the appropriate Inventories.

Three levels of highest educational preparation were defined for registered nurses: associate degree and diploma: baccalaureate; and master's and doctorate. Changes within the projections take account of master's and doctorate. Changes within the projections take account of both changing distribution of graduation from the three types of generic* educational programs (associate degree, diploma, and baccalaureate) and the movement of nurses from one of the three levels of educational preparation studied to the next level.

For the determination of the loss-gain rates in the model, the 1966 and 1972 Inventories were used for registered nurses and the 1967 and 1974 Inventories for licensed practical nurses. As detailed data for both types of licensed nurses exist within these Inventories, the loss-gain rates were calculated, using the appropriate Inventories and the data prepared for the other factors. The behavior of the model projections is therefore governed by the educational and licensure experience of 1966 through 1976 for RNs, 1972 through 1976 for LPNs, and the 1966 and 1972 Inventory experience for registered nurses, and the 1967 and 1974 Inventory experience for licensed practical nurses.

Projections for the time period beyond when data were available were dependent upon projections of graduations. In the case of registered nurses, this included projections of graduations from both generic and post-RN programs.

Full-Time Equivalent Nurse Supply

As pointed out earlier, full-time equivalents for the active supply were derived from the outputs of both models. An examination of data available from the Inventories indicated that there was a relationship between age and those employed part time. For registered nurses, the type of highest educational preparation was a determinant as well. With the exception of those under the age of 25, for all age groups, associate degree and diploma nurses had the highest part-time rates, and those nurses who had at least a master's degree, the lowest part-time rate. On an overall basis, those under the age of 25 had the lowest part-time rate--about 12 percent of those employed. The rate increased between ages 25 and 39 with 44 percent of those between 30 and 34, and 43 percent of those between 35 and 39 employed on a part-time basis. Subsequent to those years, the part-time rate declined until the nurses reached the age of at least 65, where the part-time rate was again 43 percent. Similar fluctuations were noted for licensed practical nurses.

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*/ Generic is used here to describe the three types of basic nursing programs preparing graduates to take the examination leading to licensure as a registered nurse.

Accordingly, changes in the age distribution of the nurses produced by the national supply model for each year along with changes in the educational distribution (for registered nurses) were used to develop the number of nurses in the supply that would be part-time workers and subsequent full-time equivalents. In determining full-time equivalents, a part-time nurse was counted as one-half a full-time nurse.

Supply Projections

As of January 1977, the estimated number of registered nurses in the supply was 1,011,000 and the estimated number of licensed practical nurses was 498,000. However, while there were more than a million registered nurses, the actual full-time equivalent supply was 854,000 because of the large number who can only work part-time. For licensed practical nurses, the full-time equivalency was 437,000.

Tables 4 to 6 (Appendix II) present the projections of the supply and the full-time equivalencies for registered nurses and licensed practical nurses under two sets of assumptions about anticipated graduations from educational programs preparing nurses. For registered nurses, the first set of data (Series I) reflects the impact of withdrawal of present levels and types of Federal support on current trends in the output of graduates from the nursing educational programs for registered nurses. The second set (Series II) presents the anticipated supply in terms of the maintenance of current conditions and trends in graduations. For licensed practical nurses, Series I shows the anticipated supply in terms of the maintenance of current trends in graduations from practical nursing programs, while Series II is based on the reaction of one segment of the types of schools that prepare practical nurses to current employment outlook for these nurses. A more detailed discussion of the alternative assumptions is included in the section of the report providing a fuller description of the nursing educational system.

It should be pointed out in this review that the First Report to the Congress, February 1, 1977, also contained a series of projections of the supply of registered and licensed practical nurses for the same time period as those in this report. The projections in this report reflect later data as well as revised methodology and other types of considerations as to the future trends in nursing supply.

Another point to be made is that these projections are, to a large extent, based on the latest data available that describe the extent to which nurses had placed themselves in the labor force, given certain personal characteristics. Therefore, the projections represent the anticipated supply, given that the behavior patterns of the nurses would not be changed from those evidenced in these data. [illegible] example, in 1972, it was estimated that 70.5 percent of the registered [illegible] population were employed in nursing, the highest rate since data of this type have been collected on registered nurses. The 1972 age-specific activity rates were the ones used for the continuing population in the national supply model for registered nurses. Changes in the age distribution of the nurses over the course of the projections resulted in some fluctuation of the overall rate but at all times it was somewhat higher than the 1972 one.

In general, a review of the projections included in this report indicates that the effect of the alternative assumptions regarding graduations from schools of nursing is a long-range one. The decline in the overall number of graduates from generic RN educational programs over the years for which projections were made in Series I was ultimately reflected in a projection of about 100,000 fewer registered nurses in the supply in 1990 than was in the supply for that year under the Series II assumption, which showed a slightly increasing number of graduates over the years. Under the Series I assumptions, it was projected that there would be 1,484,000 registered nurses by 1990. The Series II projection was 1,587,000. On a full-time equivalency basis, the estimates were 1,251,000 and 1,342,000 respectively.

Chapter 3

NATIONAL SUPPLY AND REQUIREMENTS COMPARISONS

A National Overview

Even though there have been rather sizable increases in graduates from generic RN educational programs in the immediate past, and relatively large growth rates in the RN supply, registered nurses are nevertheless being absorbed into the health care system. A 1974 study of experienced registered nurses showed that only 2.3 percent of the total registered nurse population were actively seeking employment at that time, a considerably lower proportion than one finds for all workers in the country. Further examination of this group showed that the majority of them had been actively looking for work for a relatively short interval and that almost three-quarters of all of them were looking for part-time rather than full-time work (Follow-Up to 1972 Inventory of Registered Nurses Study, Division of Nursing, 1977). Other studies also verify this finding. The early preliminary data from the national sample survey study indicate a similar picture, and unpublished data from the Bureau of Labor Statistics indicate an unemployment rate for registered nurses of about this magnitude in 1976, a rate below that of other health occupations composed predominantly of employees rather than of self-employed workers. Studies of newly licensed registered nurses present these relatively low rates as well. A recent (mid-1976) study showed that only 2.6 percent of the respondents were actively seeking work at the time of the study, and that 72 percent of all the registered nurse respondents to the study felt there were a number of jobs available for registered nurses, with 23 percent indicating many jobs were available (NLN's Data Service, 1977). The rate of those actively seeking work has not changed to any real degree from that found in a 1973 study (Nash, 1975).

A somewhat different picture is seen for licensed practical nurses. The growth rates for the licensed practical nurse supply and the number of newly graduated nurses have not been as large as those of registered nurses. Nevertheless, the data from the studies of newly licensed nurses showed sizable increases in the rates of those looking for work. In the 1976 study, the rate was 5.8 percent and in the 1973 study, 3 percent. Unpublished data from the Bureau of Labor Statistics also showed increasing rates over the 1970's.

From the employer's point of view, little current data exist on the number of vacant positions. However, in a 1976 study of hospitals, the directors of nursing were asked about their employment recruitment of registered nurses. About 66 percent of the respondents indicated that they had difficulty in recruiting. Fifty-five percent of all the respondents indicated that their recruitment difficulties were the same as or greater than those of 3 years prior (Roth, Patchin, 1977).

The future view for licensed practical nurses and nursing aides is one of constraint. Two of the modeling efforts provided estimates for licensed practical nurses and one for nursing aides. The System Dynamics view of the future employment market for licensed practical nurses showed the number of such nurses increasing at a much faster rate than the employment opportunities for these nurses. In the simulation of what would happen with increased utilization and responsibilities for nurses, there is an indication that the employment of these nurses would show a greater increase over the baseline simulation than would the employment of registered nurses because of the greater availability of licensed practical nurses than of registered nurses. WICHE's Panel of Expert Consultants' criteria resulted in an estimated requirement of 405,700 full-time equivalent licensed practical nurses at their "lower bound" and 594,500 at their "upper bound." The Division of Nursing supply estimates for licensed practical nurses for 1982, the year for which the WICHE projections were made, indicated an anticipated supply of from 516,000 to 518,000 full-time equivalent licensed practical nurses.

WICHE's Panel of Expert Consultants also looked at requirements for nursing aides. The projected requirements for these nursing personnel ranged from 466,600 to 629,000. No projections were made of the anticipated supply of nursing aides because, unlike nurses, these individuals are mostly on-the-job trained and unlicensed; therefore, the supply would come from the general labor market. The requirements envisioned here, however, are below the latest estimates made of the number employed within recent years.

Each of the three modeling efforts reported in chapter 1 spoke to requirements for registered nurses. The span of time considered by each was different as were the projected requirements estimates, where such direct comparisons could be made. In estimating requirements, each produced a number of different estimates dependent upon particular assumptions related to the utilization of nurses and/or the delivery of health services. 1/

1/ None of the models explicitly provided estimates that were related to present efforts to reduce the supply of hospital beds because they were all developed prior to the time any specific actions to do so were taken. The degree of the effect of such actions on overall nurse requirements is dependent upon such factors as the corollary effects on the degree of intensity of care and length of care situations developed as well as the extent to which the requirements estimates reflect alleviations in the current deficiencies in nursing care. Thus, the reduction in the supply of hospital beds may in itself not result in a concomitant reduction in requirements for nursing personnel.

The following is a summary of the range of requirements projections from each of the models and the range of supply for that year as projected by the Division of Nursing. For ease of comparison, all figures are quoted in terms of the number of registered nurses.

Year	Requirements Model	 Range of estimates*	Range of Division of Nursing supply estimates
1982	Vector	1,081,800-1,510,610	1,238,000-1,245,000
	WICHE	1,443,000-1,984,700	
1985	Vector	1,168,800-1,716,400	1,345,000-1,380,000
	System Dynamics	1,344,300-1,614,200	
1990	System Dynamics	1,570,700-1,884,800	1,484,000-1,587,000

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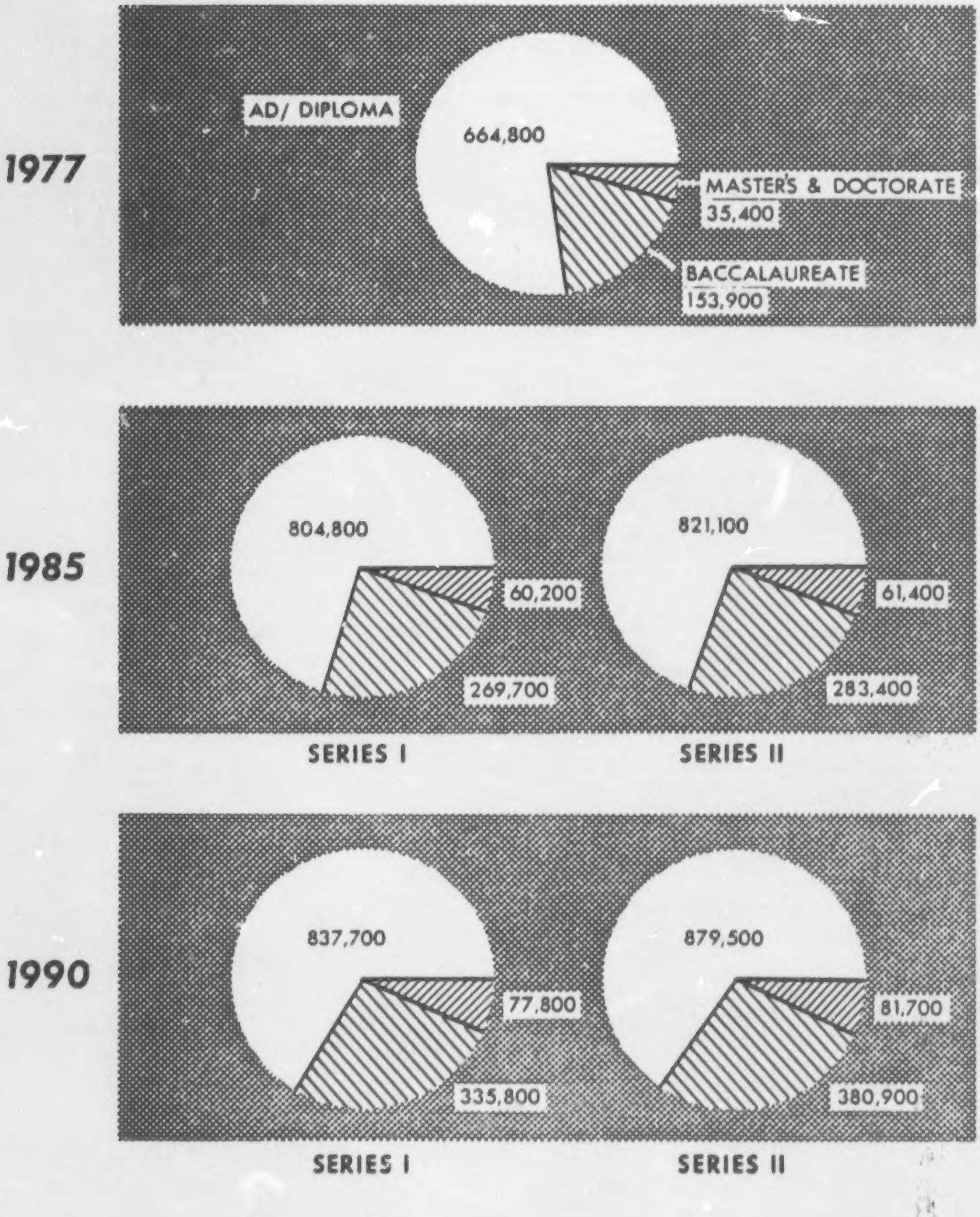
* When original data were quoted in full-time equivalents, the ratio of FTE's to total nurses from the supply estimates was used.

As indicated in table 1 in Appendix II, Vector Research, Inc. provided a range of estimates for 1985 (the last year for which that model produced projections) with a difference of about 450,000 full-time equivalent nurses between the lowest and highest estimate. The Division of Nursing supply estimates for 1985 ranged from 1,135,000 to 1,166,000 on a full-time equivalent basis. This is higher than some of the projections Vector made for 1985, but below the range of 1,176,000 to 1,450,000 which were the requirements estimates noted for the scenarios involving comprehensive national health insurance and/or extensive role reformulation for registered nurses. The System Dynamics model, while noting a picture of good balance over the course of the simulations made (through 1990) between supply and demand, saw that additional demands created by significantly increased nurse utilization and responsibilities would be such that employment could not keep up. The WICHE requirements estimates at the "lower bound" called for 1,219,000 full-time equivalent nurses and at the "upper bound," 1,677,000 full-time equivalent nurses. The full-time equivalent supply estimates for that year were 1,045,000 to 1,052,000.

Of direct relevance in the review of requirements for registered nurses, however, is consideration of educational preparation. The disparity in the initial (generic) training and the need for those educated at higher levels are reflective of the wide variety of positions registered nurses fill within the health care structure. These positions span a broad scope of complexity and responsibility. In only one of the modeling efforts--the WICHE Panel of Expert Consultants--was there a specific review of the requirements for registered nurses in the context of the educational preparation required of these nurses. However, the results of the other two models also have implications here, since areas of expansion of the use of registered nurses were generally ones requiring educational preparation at the baccalaureate or higher levels. Vector, in looking at the effects of role reformulation, explicitly dealt with expansions in the use of nurse practitioners and clinical nursing specialists and with increases in the adoption of primary nursing concepts; the first two particularly would have an impact on the educational distribution required. The results of the System Dynamics model indicated, in the baseline simulation, growth in the fraction of hospital-employed nurses with baccalaureate or higher degrees which is attributed in part to projected need for better prepared nurses to fill new nursing roles in hospitals. The model also foresaw a more rapid growth in the employment of RNs in ambulatory care than in hospitals. Ambulatory care roles have traditionally required higher educational levels than a large segment of the inpatient roles. The simulation related to increased utilization and responsibility for nurses saw greater growth in areas of autonomy and complexity of tasks than in the baseline simulation, while the national health insurance simulation foresaw the insurance programs' greatest impact on areas least covered by insurance at this time--ambulatory and home health care. Figure 8 shows the anticipated education mix among full-time equivalent registered nurses according to the way the nursing education system is presently constituted and the way in which the present supply of registered nurses is distributed.

Figure 8.-- Distribution of full-time equivalent registered nurses according to highest educational preparation, 1977, 1985, and 1990



Source: Estimates prepared by Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Comparisons of the Panel's view of the educational distribution of registered nurses with the distribution in the anticipated supply suggest a wide disparity between that which is required and that which is expected. In this connection, it should be noted parenthetically that estimates of need made by the Surgeon General's Consultant Group on Nursing in 1963 were also reflective of this disparity. Examination of the data on supply and requirements shows that the projected requirements for registered nurses with at least the baccalaureate degree far surpass the anticipated supply of such nurses, while requirements for nurses at only the AD or diploma level are far below the current as well as the anticipated supply. This occurs despite the fact that there is anticipation of a far greater growth rate in baccalaureate and higher degree nurses than in AD/diploma nurses.

Registered Nurses with Advanced Training

Preparation for positions in the areas of supervision, administration, teaching, and clinical specialization, including highly independent activities in the primary care of patients, requires education at the master's or doctoral level. The latest estimates made by the Division of Nursing indicate that 37,800 registered nurses, or 3.7 percent of the total estimated active supply for January 1, 1977, were prepared at the master's or doctoral level. Comprehensive data currently available on the position and educational levels of all registered nurses are from the 1972 Inventory of Registered Nurses. In that study, over 190,000 nurses reported themselves as being in administrative, supervisory, or teaching positions. About 12 percent of these nurses indicated that they had master's or doctoral degrees, despite the fact that about three-quarters of all the nurses with such degrees were in these positions (Roth, Walden, 1974). Other studies made subsequent to this one indicate that some change has occurred in the academic levels of nurses employed in these types of positions; however, significant disparities still exist. For example, a 1976 study of nurse faculty members in nursing educational programs showed that about 58 percent of the teaching faculty in programs preparing registered nurses had at least a master's degree. Fewer than 5 percent of all faculty members had doctorates, and those teaching at the baccalaureate or higher degree level about 9 percent had doctorates (Nurse Faculty, 1977).

In looking toward the near future, the WICHE Panel of Expert Consultants projected an overall requirement for registered nurses at the lower limit of 188,700 full-time equivalent nurses with master's degrees and 14,500 with doctorates by 1982. These requirements estimates include 32,920 nurses in top-level administrative positions; 31,125 in supervisory positions; 50,210 in teaching positions (including inservice education); 42,450 clinical nurse specialists; and about 46,500 in a number of other specialized nursing positions (Lum, Leonhard, 1977). The overall number indicated as required at the master's or doctoral level (188,700 and 14,500, respectively) is about four times the number expected to be in the active supply at that time. Although it is anticipated that, with the maintenance of present conditions, the supply of nurses with master's or doctoral degrees will increase 131 percent by 1990, these nurses will only number 81,700 on a full-time equivalent basis.

In considering the number of master's degree graduates who could be made available to the supply of nurses in the future, account has to be taken of the constraining effect of the possible availability of doctorally prepared faculty to teach at that level. Although insufficient data exist to make concrete estimates of the number of doctorally prepared nurses at this time, a rough estimate based on a review of various data sources is 1,500 to 1,600 employed doctorally prepared nurses in 1976. The data in the National League for Nursing's 1976 Nurse-Faculty Census would indicate that the vast majority of nurses with doctoral degrees are employed in some type of nursing education program, predominantly at the baccalaureate or higher degree level. Because of the small number of doctorally prepared nurses, however, relatively few of the faculty are prepared at that level. At the present time, there are about 125 doctoral graduates a year. At that rate, with allowances for attrition, large expansions in master's programs would require most of the available doctorally prepared nurses in these programs. In all academic settings, faculty are expected to engage in research as well as teaching. The 1977 Report of the National Academy of Science's Committee on a Study of National Needs for Biomedical and Behavioral Research Personnel, included a discussion of nursing research (National Academy of Sciences, 1977). Appendix III contains an excerpt of this discussion and the Committee's recommendations for nursing. In addition, there may be additional needs for doctorally prepared nurses in high level service and administrative positions.

The lack of doctorally prepared faculty to teach master's programs was taken into account, along with trends in the data on master's degree programs and students, when projections of the number of master's degree graduates were made. In those projections for the Series I estimates, which assumed lack of Federal support, the rate of increase noted in the trend data declined by one-half and enrollments in these programs were slightly constrained. Graduation levels were determined from enrollments and the proportion of those students who would be full-time or part-time. The present trend of increase in the number of part-time students was continued throughout the projection period. Results of these considerations indicated a very slow upward trend in the production of master's degree nurses. The number of such graduates went from 3,437 in the 1975-76 academic year, the last date for which data were available from the National League for Nursing, to 4,600 by academic year 1988-89.

In the Series II estimates, which reflected the maintenance of current conditions, the trend in the number of master's programs established was continued into the future and average enrollments in each program were maintained at the latest level noted in the current data. The trends in the proportion of part-time students were also continued as they were in Series I projections. These data resulted in an increase of 57 percent in the number of graduates since 1975-76, for a total of 5,200 graduates by 1988-89.

An alternative was examined, assuming that additional support would be available for master's degree students starting in 1981, which would reverse the trend toward part-time attendance at school from the 45.2 percent (noted in National League for Nursing data for October 1976) to 25 percent as of October 1985. This resulted in an increase of only 7 percent in the number of graduates produced during the projection period over the Series II projections.

Nurse Practitioners

In addition to the registered nurses with graduate degrees, there is another component of the registered nurse supply to which special attention has been directed in the determination of requirements for registered nurses. Special programs designed to prepare nurse practitioners are fairly recent and, at this time, registered nurses who practice with this title represent a relatively small segment of the registered nurse work force.

Based on the findings of the State University of New York (SUNY) study, it was estimated that the number of nurse practitioners in practice in 1975 who had graduated from programs that met the criteria in the study was 5,100 (Sultz et al., 1976). At the time of the SUNY study, there was a total of 133 training programs in existence that met the study criteria. Since then an estimated 125 additional programs have been established, making a total of over 250. On the basis of estimates of the number of graduates from nurse practitioner programs since the 1975 estimate was made, it can be estimated that in 1977 there were about 8,000 nurse practitioners who graduated from formal programs.

There is a sizable number of registered nurses who regard themselves as nurse practitioners or nurse midwives who did not graduate from nurse practitioner programs that met the criteria in the SUNY study. Some were trained on the job by a physician. The Follow-up Study of 1972 estimated a total of 8,500 nurse practitioners and midwives employed at that time (Division of Nursing, 1977). Preliminary data from the sample survey of registered nurses yield an estimate of 9,185 nurse practitioners and 985 nurse midwives employed in August 1977, a total of 10,170. Extrapolating these estimates until 1982 gives a projection of approximately 15,000 nurse practitioners. However, this number assumes continuation of the present level of Federal support for nurse practitioner preparation. With reduced support this number would be no more than 12,000.

The WICHE Panel of Expert Consultants identified specific criteria for the projection of requirements for nurse practitioners. These criteria, as shown in figure 6, reflect the proportion of "direct client care registered nurses" in four practice settings who should be prepared to function in nurse practitioner roles. The settings identified were hospital ambulatory care, nursing homes, physicians' offices, and community health. Applying these criteria to the projected number of "direct client care registered nurses" in these settings yielded a range of 1982 requirements for nurse practitioners of 26,905 to 57,132. Clearly, the projected supply of 15,000 does not even approach the lower bounds of the projected requirements.

Future requirements for nurse practitioners would depend on the extent to which they can be effectively utilized in the health care system. From the field of pediatrics, where the first formal nurse practitioner education program began, utilization of practitioners has expanded to many health care settings. The expansion was undoubtedly partly due to the 1971 report of the Secretary's Committe to Study Extended Roles for Nurses, entitled Extending the Scope of Nursing Practice. The Committee saw much room for expansion in nursing roles in primary, acute, and long-term care.

The variety of ways in which nursing care has been expanded has been recently documented in the overall project, Analysis and Planning for Improved Distribution of Nursing Personnel and Services, conducted by the Western Interstate Commission for Higher Education. One aspect of the project was to catalog innovative uses of nursing skills. Nearly 200 innovations were documented (WICHE Innovations, 1977). Among some of the job titles uncovered by the study were community health nurse practitioner, geriatric nurse practitioner, student health service nurse practitioner, and family health practitioner.

Studies documenting the effectiveness of such roles would assist in developing estimates of requirements. However, few studies are available that have evaluated the nurse practitioner role. The scarcity of studies is due to the period of time necessary to study the relationship between care provided by nurse practitioners and client outcomes, as well as to the difficulty of measuring "quality" of care. Most evaluations of practitioners are anecdotal in nature and are confined to the nursing process rather than client outcomes.

Recent revisions in nurse practice acts have considerably lessened restrictions on the functions registered nurses can perform. According to a recent study, since March 1971 "30 states have revised their nurse practice acts to facilitate role expansion for RNs by authorizing diagnosis and treatment" (Bullough, 1977). In addition, 12 States have expanded their definitions of professional nursing to include more autonomous functions, especially those of diagnosis and treatment. Expectations are that the legal expansion in definition of the nursing role will continue in the future. This should have a positive effect on nurse practitioner requirements, since some nurse practitioner functions extend beyond the traditionally defined nursing role.

A powerful stimulus to growth in the requirements for nurse practitioners would be reimbursement by third party payers for services provided. This was recognized by Congress in the Social Security Amendments of 1972 (P.L. 92-603) which authorized experiments and demonstration projects to determine "... the most appropriate methods and amounts of reimbursement under health care programs established by the Social Security Act for services which are performed independently by an assistant to a physician." To examine this issue, the Health Care Financing Administration has launched a major study known as the Physician Extender Reimbursement Study. Since the study is not yet completed, recommendations have not been forthcoming. The Congress recently enacted P.L. 95-210, and draft regulations for its implementation provide for reimbursement under Medicare and Medicaid for services of nurse practitioners in rural health clinics.

Chapter 4

FACTORS AFFECTING SUPPLY AND REQUIREMENTS

To plan for a future supply of nursing personnel requires knowledge and understanding of a variety of factors related to the present nursing personnel population. Section 951(a)(2) of P.L. 94-63 requested information about a number of these factors (see Appendix I). . In the First Report to the Congress, February 1, 1977, information was collated from a number of different data sources on various aspects of the population. This information in many instances constitutes the latest and most complete data available. Therefore, some of the data are repeated here to describe the characteristics of nurses and their employment settings. In addition to the information specifically requested, other data necessary to determinations of future supply and requirements are provided.

New Additions to the Nursing Population--United States

The primary source of new additions to the supply of both registered and licensed practical nurses is the number of graduates from schools located in the United States.

Three types of programs awarding different credentials prepare their graduates for licensure as registered nurses:

1. Programs based in hospitals are usually 3 years in length and lead to a diploma.

2. Programs located in community colleges are 2 academic or calendar years in length and lead to an associate degree.

3. Programs located in senior colleges or universities most often lead to a baccalaureate. The baccalaureate programs may offer either an integrated curriculum of 4 years or an upper division major in nursing based upon completion of 1 or 2 years of prescribed study in liberal arts and sciences. Some senior colleges or universities enroll students in associate degree programs, which are 2 years in length, as are community college programs.

Practical nursing programs, offering generally the same course of study, and ranging in length from 9 to 12 months, may be located in secondary or vocational schools and adult education settings, as well as in colleges, community colleges, and hospitals. In recent years several programs have been organized in community and senior colleges with the particular objective of facilitating career mobility. In these programs, the curriculum is organized to permit a student to qualify for licensure as a practical nurse after 1 year of study, or to qualify for licensure as a registered nurse after completion of 1 additional year if an associate degree is awarded or after 3 years if a baccalaureate is awarded.

Practical Nurse Graduates

Data on practical nursing education programs in the United States compiled by the National League for Nursing from 1971-72 to 1976-77 show that the number of these programs has increased over this period, although the average enrollment per program has been fairly consistent, numbering 44 or 45 (NLN, Schools, LPN/LVN, 1977). As of October 1971, there were 1,271 State Board-approved practical nursing programs in the United States with an enrollment of 57,114 students. In October 1976, the number of programs had increased to 1,318 with an enrollment of 58,423 students. There has been a shift in the location of licensed practical nurse programs with an increase in those located in community colleges and a decline in those sponsored by hospitals. If this trend continues at the same rate, hospital-sponsored licensed practical nurse programs would be expected to phase out by the mid-1980's. Both community college and hospital sponsored licensed practical nurse programs have lower average enrollments than those in other settings; however, their completion rates are higher. For all programs, data for the 1975-76 academic year indicate that 80.6 percent of those enrolled as of October graduated at the end of the year.

These facts were the basis for the projections of new additions in the anticipated supply of licensed practical nurses. The Series I projections, which assume the maintenance of current trends, were based on 3 conditions: statistical trends for the overall number of practical nursing programs, an average enrollment of 44 students, and a completion rate of 80.6 percent. The Series II projections were based on the assumption that the previous rate of increase in the number of community college programs would be reduced by half as a result of evidence that the labor market for these graduates has become tighter. The projected number of graduates resulting from Series I and II is shown in table 8 in Appendix II.

Graduates from Programs Preparing Registered Nurses

A review of data from the National League for Nursing on programs preparing registered nurses shows that the number of programs leading to associate and baccalaureate degrees has increased over the years, while the number of programs leading to a diploma has decreased (NLN, Schools, RN, 1977). As of October 1976, there were 626 State-approved programs leading to an associate degree, 338 leading to a baccalaureate degree, and 390 leading to a diploma. The decline in the number of diploma programs preparing registered nurses has been consistent over the years, and if the trend continues at the present rate, they would be expected to phase out by the mid-1980's. For all three types of programs the average number of admissions per program has remained fairly constant over the last few years, with those leading to a baccalaureate degree having the highest average admissions per program and those leading to a diploma, the lowest. For the 1975-76 academic year there were 112,177 admissions to these three types of programs, of which 32 percent were in baccalaureate programs, 47 percent in associate degree programs, and 21 percent in diploma programs.

Both the Nurse Training Acts of 1971 and 1975 provided support to all three types of programs through capitation funds and construction monies. A review of the latest data on the number of programs that applied for and received capitation funds shows that while only 45 percent of the diploma programs were awarded capitation grants, approximately 79 percent of the associate degree programs, and almost all of the baccalaureate programs were awarded grants. Further examination of the capitation grant data shows that capitation funds represented school funds for approximately 10 percent of the student enrollment in baccalaureate programs, and approximately 9 percent of the student enrollment in associate degree programs.

These indications of trends were taken into account in developing the projections of graduates who would be part of the anticipated supply of registered nurses. The Series I projections, which assume a lack of Federal support for nursing education programs, show a gradual decline in average admissions to programs leading to associate and baccalaureate degrees after the academic year 1977-78. The decrease is equal to the percent of students for whom the capitation funds offset costs within a 5-year period, with a slight decline thereafter. It further assumes that, for these programs, the rate of increase in the number of programs, as evidenced in the trend data, would decrease by one-half as a result of the withdrawal of Federal support presently available under the Nurse Training Act.

Series II, which represents the maintenance of current conditions and trends in the education of students preparing to become registered nurses, was developed from the statistical trends in the annual NLN data available from 1965-66 through 1975-76. It reflects an increasing number of associate degree and baccalaureate programs and increases in the average admissions to each program.

The declining trend in the number of programs leading to a diploma, and the increase in the average admissions to the remaining diploma programs, were reflected in both Series on the assumption that the withdrawal of Federal funding would not affect the trends.

Graduations from all three types of programs in both Series were determined by taking into account the various lengths of programs and the completion rates obtained from the last set of data available. Figure 9 depicts the trends in graduations from associate degree and baccalaureate programs developed from these projections. The number of projected graduations appears in tables 9 and 10, in Appendix II.

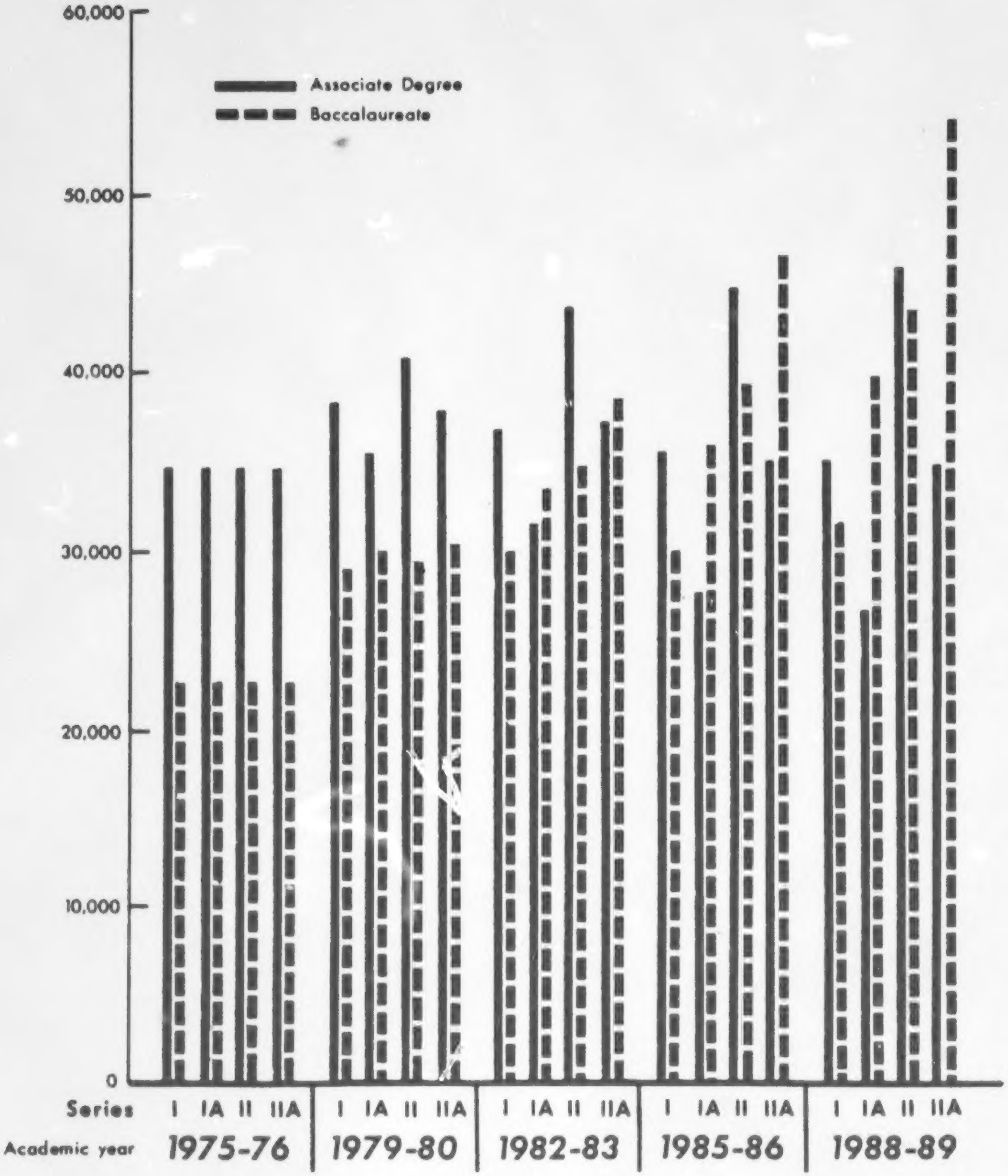
Considering the requirements for additional graduates from baccalaureate programs and the declining requirements for those from associate degree programs, an alternative projection was made for each Series based on maintaining the same overall number of programs indicated in each of the two Series. According to the latest data available at the time these projections were made, 24 percent of admissions to associate degree programs were to programs located in senior colleges or universities. (This information was for the 1974-75 academic year; 1975-76 data indicate that this percentage has risen to 26 percent.) On the assumption that these admissions could be converted to baccalaureate admissions, since they were already in institutions with the capability of granting baccalaureate degrees, it was projected that the admissions to associate degree programs would gradually shift so that by 1985-86, 24 percent of these admissions would be to programs awarding a baccalaureate degree. The resultant number of graduates are identified as "A" series in figure 9 and tables 9 and 10 in Appendix II. These projections of alternative graduations were also used in the projections of anticipated supply of registered nurses at each educational preparation level. While the shift to baccalaureate education ultimately resulted in a sizable difference in the number of graduates from each type of program, it had almost no impact on the distribution according to educational preparation of the anticipated supply of registered nurses.

After completion of an education program, the new graduate must pass the appropriate licensing examination in order to practice as a practical or registered nurse. The same licensing examination is administered in all the States. Two types of new entrants into nursing may take these licensing examinations -- those who graduate from State Board-approved schools of nursing and those who qualify on the basis of credentials from foreign schools.

New Additions to the Nursing Population -- Foreign Nurses

According to the Immigration and Naturalization Service, there were 8,062 professional nurses admitted to this country in fiscal year 1976: 6,421 as immigrants and 1,642 under nonimmigrant visa categories. While in earlier years, immigrant nurses were more likely to come from Canada and European countries, in more recent times the largest proportion of both immigrant and nonimmigrant nurses are coming from Asia.

Figure 9.-- Projections of graduations from associate degree and baccalaureate programs preparing registered nurses,[1] 1975-1976 to 1988-1989 academic years



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[1] Diploma programs not included. The projections contained the same graduation levels for these programs in each of the series.

Source: Estimates for 1979-80 to 1988-89 academic years prepared by Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare. Data for the 1975-76 academic year reported by the National League for Nursing for graduates of U.S. schools only.

Although the visas of nonimmigrant nurses are for temporary residence, they may be extended indefinitely if the holders continue to comply with the conditions of entry. It is known that a large proportion of those admitted on a temporary basis seek renewal of their visas until they can change their status to permanent residence.

The exact number of foreign-trained nurses in this country is not known, because no record is kept of the movement of foreign-trained nurses out of the country and their possible reentry under a different visa category. Also, it is possible that individuals entering the country as spouses, parents, or dependents of United States citizens or permanent resident aliens are trained as nurses but do not identify themselves as such. A limited survey made in 1976 by the Division of Nursing with the cooperation of the Statistics Branch of the Immigration and Naturalization Service, identified a small number of these individuals in an examination of 4,450 visa applications processed in 1 month from persons listing themselves as housewives, unemployed, or no occupation, but the exact number of such individuals cannot be determined.

In considering the effect of foreign-trained nurses on the supply of registered nurses, thought should be given to their ability to obtain licensure in this country. In a study of State licenses issued to foreign nurse graduates in 1970, 1971, and 197[illegible], made by the American Nurses' Association (ANA) for the Division of Nursing, the conclusion was drawn that a large number of the applicants do not become licensed (Foreign Nurse Graduates, 1976.) During the ANA-survey years, the States reported that of the 20,485 licenses issued, 72 percent were issued on the basis of endorsement of foreign nurse credentials. This practice has now been discontinued, and foreign-trained nurses are now required to take the licensing examination. The ANA survey indicated that, among those foreign-trained applicants who took the licensing examination, 81.5 percent failed the first time they took the examination. The survey concludes that after repeated tries, approximately 50 percent are successful in obtaining the required license.

On the basis of data reported in a 1974 study of registered nurses in which the nurses were asked to indicate the location of their basic school of nursing, it was estimated that only about 2 percent of the registered nurse population was foreign-trained (Follow-Up to 1972 Inventory of Registered Nurses Study, Division of Nursing, 1977). The early data examined from the national sample survey of registered nurses under way at this time tend to confirm that relatively low proportion in the licensed population. However, while not verified through actual studies, it is assumed from various sources of information that, even if unlicensed, the foreign-trained nurse is employed in some nursing capacity.

Characteristics of the Licensed Nurse Population

Important to the determination of the anticipated supply of nurses are the characteristics of the licensed population of nurses. At the present time, the latest available data on the overall characteristics and distribution of these individuals come from the cited Inventories.

Registered Nurses

Most registered nurses are women. At the time of the 1972 Inventory of Registered Nurses, only 1.3 percent of the nurses were men. Most of the registered nurses were married (71.9 percent) and about half were 40 years of age or younger. A later study of this group provided estimates that about 5 percent of the group were other than white, 3.3 percent black, and 1.7 percent from other minority backgrounds. More detailed information from this study, on nurses with minority backgrounds, was included in the First Report to the Congress, February 1, 1977.

According to data from the 1972 Inventory of Registered Nurses, it was estimated that 70.5 percent of the 1,127,657 nurses with licenses to practice were employed in nursing at the time. Of the nurses who actually reported their employment status, 64.9 percent were employed full time, 30.6 were employed on a part-time basis, and 4.5 percent did not indicate their employment status. Variations in these rates were noted in different areas of the country. The proportion of registered nurses employed in nursing in the States in the Northeastern and Pacific areas of the country generally was lower than in other parts of the country. Variation also exists in the proportion of those employed on a full- or part-time basis. The highest proportion of part-time nurses among the employed nurses was found in the New England area of the country and the lowest in the South Central area (Roth, Walden 1974).

To obtain additional insight into characteristics of the nurse population in the 1972 Inventory, the Follow-Up Study was made in 1974 of a sample of those nurses. In part, the study sought the reasons for part-time employment and the future work plans of those who were employed part time, and the reasons for not working in nursing and the future work plans of those who were not employed in nursing. The results of the study showed that being married with children living at home was an important indication of part-time status. Prominent among the reasons for working on a part-time basis were two related to time needed at home and taking care of children. About 36 percent of the part-time nurses indicated they would definitely or probably work full time at some future date; 42 percent stated they would not; and 20 percent were uncertain as to their future plans. The vast majority of inactive nurses were not seeking work at the time of the study. However, 17 percent indicated they would definitely return to nursing in the future, 23 percent thought they probably would, and 26 percent were uncertain as to their future plans. Interest in returning to work in the future declined with the age of the nurse and/or the length of time they had been inactive. The majority of the inactive nurses indicating interest in future nursing employment felt they would seek part-time positions rather than full-time. The fact that a number of the inactive nurses do return to active status in the future is indicated through an examination of age-specific activity rates. The proportion of those who are active in the licensed population is highest for the youngest age segment. It declines in the 30-year age groups and increases in the 40-year and 50-year age groups. As pointed out earlier, a pattern of this type is also discernible in the proportion of the supply that is full-time.

The educational attainment of registered nurses is another important factor in the determination of whether the supply will meet the requirements for registered nurses. Educational attainment is determined by initial nursing education and education sought after initial entry into nursing. The 1972 Inventory of Registered Nurses indicated that most of those who reported their type of basic nursing education program had obtained their education in diploma programs. About 12 percent had their initial education in a program offering a baccalaureate (or, in a few instances, a master's degree), and 5 percent in a program offering an associate degree. The 1974 study showed that about 9 percent of the diploma graduates and 10 percent of associate degree graduates had subsequently obtained at least a baccalaureate degree. Data from the 1972 Inventory and the subsequent 1974 Follow-Up Study indicated that baccalaureate graduates are more likely to obtain graduate degrees; in the 1974 study, 17 percent of baccalaureate graduates had obtained a master's or doctoral degree. The 1974 study indicated, as well, that nurses with associate degrees or baccalaureates were more likely to have achieved additional education in a shorter time period after graduation from their initial program than were diploma graduates.

In the 1974 study, about 9 percent of the registered nurses were enrolled in formal education programs leading to an academic degree; about three-quarters of these were studying for a baccalaureate and the remainder were involved in master's- or doctoral-level study. Early preliminary data from the ongoing national sample survey of registered nurses indicate that the proportion of registered nurses enrolled in post-RN educational programs might have increased somewhat but still is a relatively small percent of all nurses. About 85 percent of the nurses in the 1974 study who were enrolled in school were also working at the same time, largely on a full-time basis. About 5 percent of all the enrollees indicated that they received financial support from Federal traineeships, scholarships, or grants. Most of the group receiving grants were studying at the master's or doctoral level.

Continued study of the registered nurse population is important to the continued analysis of the supply of nurses, and it is anticipated that two future data sources will provide updated information as well as additional insights into the factors affecting the supply of nurses. One source, the 1977 Inventory of Registered Nurses which is scheduled for completion by the end of 1978, will update the detailed data on the broad characteristics of registered nurses contained in the 1972 Inventory. The other source, the National Sample Survey of Registered Nurses, scheduled for completion within several months from this writing, will expand the information on these characteristics and provide the means for an intensive analysis of the effects of a variety of factors.

Licensed Practical Nurses

While the level of detail available on registered nurses is not available on the licensed practical nurse population, inventories have been conducted by the ANA of these nurses as well. These studies provide similar data to those available on registered nurses from the inventories of that group.

The 1974 Inventory of Licensed Practical Nurses showed that, like registered nurses, most practical nurses were women; only 2.7 percent were men. About 60 percent of the licensed practical nurses were married. Their median age was 38.8.

From data in the 1974 Inventory of Licensed Practical Nurses, it was estimated that 76 percent of 533,459 nurses holding licenses to practice were employed in nursing. Of those who indicated they were employed in nursing, 73.3 percent indicated they were working on a full-time basis, 23.5 percent stated they were working on a part-time basis, and 3.2 percent did not report their full- or part-time status. As was true for registered nurses, variation existed from area to area in the country in the proportion of those employed of the total nurse population, and in the proportion of those working on a part-time basis. States in the northeastern part of the country tended to show lower proportions of those employed in nursing than the Southern States. A pattern of part-time employment on a geographic basis similar to that of registered nurses was shown for licensed practical nurses.

Practical nursing does not require the levels of academic attainment that positions for registered nurses require. Added achievement for practical nurses is obtained through attendance at programs preparing for registered nurse practice and the acquisition of registered nurse licensure. According to the latest data from the National League for Nursing, in October 1975, approximately 4 percent of the students enrolled in basic programs preparing registered nurses were practical nurses.

The 1974 Inventory of Licensed Practical Nurses examined the educational achievements of practical nurses by looking at the secondary education level obtained. The report of the Inventory shows that 63.5 percent of the licensed practical nurse population reported having high school diplomas, and 11.4 percent reported having high school equivalency diplomas. Some 11 percent of the nurses did not answer the question, while the remainder indicated a varying number of years of high school completed, from 0 to 4. The Inventory also identified whether the practical nurses had obtained their first license on the basis of graduation from a school of practical or vocational nursing. (These nurses are termed vocational nurses in California and Texas). The point is important, because a number of those in the licensed practical nurse population have been licensed by waiver of some requirement for licensure owing to the relative recency of State licensing laws (the last State having enacted its law for the first time in 1960) and the evolving nature of these laws. Seventy-six percent reported that they had graduated from a school of practical nursing (Roth, Schmittling 1977).

Employment Distribution of Nursing Personnel

The previous data provide an overview of the employment status of the licensed nurse population. An analysis of the active supply of nursing personnel and the relation of supply to requirements also involves detailed data on the settings in which nurses work and the level of work performed. To obtain this review, a multiplicity of data sources is required. Studies such as the Inventories can provide a broad description of the distribution of licensed personnel over various segments of the health care system. To obtain detailed information on personnel in particular areas in the health care system, and to determine the interaction of one type of personnel with the other, studies are needed of the segments of the health care system as well. These studies also provide necessary data on unlicensed nursing personnel--nursing aides--and it is only through these studies that counts can be obtained of them. Details from all of these sources are reported in the First Report to Congress, February 1, 1977, which remains the latest information available. Most of the data included in that report are repeated in tables in Appendix II of this report. A brief summary of the data reviewed in that report is also included here.

Employment Settings of Registered Nurses

The 1972 Inventory of Registered Nurses reported that most registered nurses are employed in hospitals, a figure estimated at 65.2 percent of the total employed complement. About 7 percent were employed in nursing homes and 5 percent as private duty nurses. Private duty nursing by registered nurses is primarily carried out in institutional settings.

Registered nurses providing care for out-of-institution patients, including those in community or school health settings, physicians' offices, and industrial settings, comprised 18 percent of the total employed group. About 4 percent of the registered nurses were faculty in registered and practical nursing education programs.

Positions Filled by Registered Nurses

Since registered nurses' positions within the health care system span areas from direct patient care to administration, supervision, and teaching, the extent to which nurses are distributed along this spectrum is important to the analysis of their supply. About 45 percent of employed registered nurses in the 1972 Inventory held positions other than staff or general duty nurses, with about a third in positions such as head nurse, supervisor, instructor, or nurse administrator. However, from data in the 1974 Follow-Up Study of the 1972 Inventory population, which looked at the activities performed by registered nurses, it appeared that about 20 percent were in positions in which such activities as administration, supervision, or teaching predominate. Preliminary data from the national sample survey indicate that relatively few nurses carry the title of nurse researcher. Nursing research, though, is carried out primarily by those employed in positions where other activities might predominate, such as clinical nursing or teaching.

The 1972 Inventory did not specifically identify nurses in specialized direct patient care positions such as nurse clinicians, clinical nursing specialists, or nurse practitioners. However, from data in the 1974 study and preliminary data from the national sample survey, there are indications that about 2.5 to 3 percent of the 1977 total active nurse supply, or 25,000 to 30,000 individuals, may be in positions with those position titles.

Nurse Practitioners

To close the gap in information available on nurse practitioners, the Division of Nursing in 1973 awarded a contract to the State University of New York at Buffalo to undertake a longitudinal study of nurse practitioners. The study was designed in two phases. Phase I is a study of nurse practitioner training programs that had started instruction with enrolled students by January 1, 1974, and their students. Phase II is based on questionnaires sent to graduates of the nurse practitioner programs to elicit data on job choice, employability, and satisfaction. The two phases of the SUNY study provide the most complete data on nurse practitioner resources in the United States. The results of Phase I of the study were presented in the First Report to the Congress, February 1, 1977. Some selected findings from that report, as well as data from Phase II, are included here.

A total of 131 of 133 nurse practitioner educational programs that met the criteria for inclusion in the study responded to the questionnaires. These criteria included: offering a formal curriculum as opposed to inservice training for their own employees; starting instruction with enrolled students by January 1, 1974; providing preparation in extended nursing roles, i.e., primary care skills such as history taking, physical examination, ordering laboratory tests, and assuming responsibility for medical management of selected cases with emphasis on primary care; and requiring that students be registered nurses in order to enroll.

Of the 131 programs, 86 awarded certificates and 45 master's degrees. Forty-two of the certificate programs were in pediatrics; the largest number of master's programs was family nurse practitioner (12).

Geographically, the South had more programs than other regions in the Nation, with 28 programs. There were 21 in the Northeast; 19 in the West, and 18 in the Midwest. On an individual State basis, New York had the most programs (13) with California next (11). The average length of programs varied greatly. Certificate programs averaged 5.4 months, while master's programs averaged 15.8 months.

A total of 1,101 students responded to student questionnaires, or 85 percent of the students in all the nurse practitioner programs who would graduate between May 1974 and June 1975. Of the 1,101 students, 35 percent were in pediatric nurse practitioner programs; 26 percent in family nurse practitioner programs; 22 percent in adult nurse practitioner programs; and the remainder were divided among maternity, midwifery, and psychiatric programs. The smallest number of students were in psychiatric programs.

Ninety-eight percent of the students were female; 89.9 percent white; 55.3 percent married; and the average age was 35.2 years. The students had spent an average of 7 years in nursing prior to entering the nurse practitioner program, with 36.2 percent, the single largest proportion, working in inpatient settings in hospitals in their last jobs. Over 45 percent were members of the American Nurses' Association.

In Phase II of the study, 753 of those who had graduated between May 1974 and June 1975 responded--a response rate of 67 percent from students in certificate programs and 71 percent from those in master's programs. Seventy-eight percent of the certificate graduates and 54 percent of the master's graduates were employed as nurse practitioners. Employment was highest in the Northeast, 74.5 percent, and lowest in the South, 66.0 percent.

Seventy percent of the white graduates were employed as nurse practitioners, compared with 84.2 percent of the black graduates. Those who did not become nurse practitioners joined nurse practitioner training programs as faculty.

Graduates of nurse practitioner programs were employed in a variety of settings. As table 18 in Appendix II shows, 57.4 percent of the graduates were employed by physicians. About 80 percent of the nurse practitioner respondents stated that physicians directly supervised their work. Of the graduates, 32.7 percent were employed in inner-city settings, and 16.2 in rural areas.

Titles used by graduates varied; 54 percent used nurse practitioner, 18 percent retained the traditional titles used for registered nurse positions, and the remainder used titles such as nurse associate, nurse clinician, clinical nurse specialist, or nurse midwife.

Salaries averaged $14,017 per annum for master's program graduates and $12,916 for certificate program graduates. Employers of nurse practitioners were considerably more satisfied with their performance than were the practitioners themselves. About 72 percent of employers stated that they were very satisfied with nurse practitioner performance compared with only 27.4 percent of the practitioners. Over 90 percent of the employers felt that the value of the services of the practitioners outweighed the costs of the educational program.

Finally, barriers to the development of the nurse practitioner role were seen as arising from a number of sources. Legal barriers were most frequently cited by 31 percent of the respondents. Resistance from other health care providers was seen by nearly one-fourth of the respondents as a constraint on the growth in the use of nurse practitioners.

Licensed Practical Nurses

Licensed practical nurses are more likely to be employed in institutional settings than in those settings caring only for out-of-institution clients. The 1974 Inventory estimated that 63.5 percent of employed licensed practical nurses were working in hospitals; 17.4 percent were working in nursing homes, and 7.5 percent were performing private duty nursing. Other studies have indicated that licensed practical nurses do private duty nursing in patients' homes more frequently than registered nurses. Only about 9 percent of licensed practical nurses worked in settings such as community health, industry, and physicians' or dentists' offices, with the largest number in physicians' or dentists' offices. About 95 percent of aides, it is estimated, are employed in hospitals or nursing homes.

The Hospital Setting

The above description represents a summary of the proportionate distribution of nursing personnel among the various settings for the delivery of health care. Variations in these proportions differ from area to area and are shown in the tables included in Appendix II. As indicated above, however, the major setting for nursing personnel is hospitals. At the present time the latest available data on the mix of nursing personnel in this setting is a 1972 study of nursing personnel in hospitals published by the Division of Nursing in 1974. Data from that study provide a picture of substantial variation in personnel mix on a geographic basis and according to type of hospital. This variation is most apparent in the ratios of nursing personnel per 100 patients in non-federally operated short-term general and allied special hospitals, which have the largest number of patients in hospitals and employ the most personnel. A brief review of the data on these hospitals shows that there is an inverse relationship between the size of the hospital and the total ratio of nursing personnel (including bedside registered nurses, licensed practical nurses, and aides) per 100 patients. Smaller hospitals utilize a much higher proportion of aides relative to registered nurses, while the licensed practical nurse ratio shows very little variability from one size group to another until the 1,000-and-over bed size is reached. These very large hospitals show much lower ratios than others for all categories of personnel. States vary less in the total ratio of nursing personnel per 100 patients than in the ratios for the specific categories of personnel. This relationship holds true as well when bed size is also taken into account.

Average Compensation of Nursing Personnel

Another aspect of employment of nursing personnel that has relevance to anticipated nurse supply is compensation. Data on the average rates of compensation for nurses by type and location of practice require an amalgamation from a number of discrete studies. Much of the available data were reported in the First Report to the Congress, February 1, 1977. A detailed description of these studies and their findings were incorporated into that report. Updated information in this report comes mainly from the same sources, and are summarized in table 26 in Appendix II. The data are shown on an annual salary basis for ease of review. A number of different agencies, both Federal and private, are involved in the collection of salary data on nursing personnel. When quoted in a study on other than an annual basis, the earnings have been translated to an annual basis.

Another important point can be noted from reviewing the available information. Inasmuch as hospitals are the dominant employer sector for nursing personnel, the salaries for the hospital segment of the health care system reflect salary levels for the major portion of nursing personnel.

For this employer group, however, only limited data are available to show variations on a geographic basis as well as on a position-level basis. The Bureau of Labor Statistics information carried in this report covers only 23 large metropolitan areas in the country. It is known that hospital salary levels differ according to the size and type of hospital, with diversity as well according to geographic location of the hospital. Generally, higher salaries are paid in larger population centers. Thus, the salary levels indicated in this report for hospital-employed nursing personnel cannot be taken as representative of general salary levels for all such nursing personnel. The same situation exists for salaries in the nursing home sector, an area identified in several requirements studies as needing substantial change in nursing personnel staffing.

Chapter 5

DISTRIBUTION OF SUPPLY AND REQUIREMENTS IN STATES

Material on the supply and requirements for nursing personnel in the Nation as a whole was presented earlier in this report. However, as can be seen from the data describing the characteristics and employment settings of nursing personnel, distinct differences exist from State to State. In deriving the supply and requirements estimates for the States, the same overall assumptions and criteria were used as in the national estimates. However, since these assumptions and criteria were related to the distribution of services and/or trends for the particular State, the application of these centrally determined assumptions and criteria have varying implications in the States.

Two of the requirements modeling efforts previously described addressed the State as a unit of analysis. One considered nursing requirements through the development of a set of assumptions and criteria for staffing appropriate for future utilization of nursing personnel (WICHE State Model Approach). The other considered the impact of anticipated changes in the health care system on registered nurse requirements (Vector Research, Inc.). To obtain projections of the anticipated supply, the Division of Nursing developed a model which took into account current available data on the distribution of licensed nursing personnel in the States (State supply model). Each approach was described in detail in the review of requirements and supply from the national perspective. Following is a discussion of the specific impact of these approaches on the State projections included in this report.

Requirements for Nursing Personnel in States

In developing the State Model approach, WICHE focused on devising a tool to be used to develop projections of requirements for nursing personnel that would take into account the client population and their health needs and the program and service requirements necessary to accomplish the goals developed to satisfy those needs. An integral part of the approach is the use of a State and/or local advisory group to examine the needs, set the goals, and determine the program and service requirements, including the way nursing personnel fit within these criteria. In order to develop actual projections of State requirements, a national Panel of Expert Consultants was convened by WICHE. The Panel had available an extensive bank of national data containing State-specific information. From these data, the diversity among States was apparent. In recognition of geographic differences, a range of criteria covering the utilization of nursing personnel within the various health care settings was proposed. The criteria related to the number and type of personnel required and the educational levels of the registered nurse personnel. The criteria established are included in figure 6. These criteria were applied uniformly to all States according to the respective State's population characteristics and mix of services. The general assumptions about services, covered in the previous description of this approach, were also used to determine what a State's services would be like in 1982.

In making the projections, the United States as a whole was treated as a State. That is, the national estimates of requirements using the State Model approach are not an aggregate of the individual State data. Therefore, there are differences between the estimates for the United States as a whole and the aggregated State data because of the individual application of these uniform assumptions to each State and to the country as a whole. Tables 27 and 28 (Appendix II) provide the projections of requirements by State resulting from this model.

The model developed by Vector to assess the impact of national health insurance, growth in health maintenance organization enrollments, and the reformulation of nursing roles, was initially developed to determine these effects on the registered nurse requirements for the country as a whole. With the statutory requirement to determine nursing personnel requirements by State, the work was extended to examine the impact of these health system changes on States. Again, the methodology and the basic assumptions described for the projection of national requirements were used for the State projections. In the application of these assumptions to States, however, the State's own trends formed the basis of the projections, as was the case in the State Model approach. For example, the baseline scenario assumes that there will be no new HMOs added during the projection period and those already in existence will continue to grow at rates derived from historical data. Therefore, the State of Washington, which had high enrollment in HMOs continues to experience growth rates in HMO enrollment throughout the baseline projection. These effects are carried throughout the various scenarios, even when the HMO effect is not being specifically considered. When the HMO effect is specifically considered, however, HMO growth has very limited impact on the State of Washington. Another example can be noted in the States of Maryland and Massachusetts. In 1972, these States had average RN/LPN ratios in inpatient hospital units higher than the national average. When the uniform assumption, used to predict the effect of role reformulation, was applied to Maryland and Massachusetts, the requirements in the role reformulation scenarios in these States reflect a decrease over the baseline requirements for the States. If alternative forms of expressing role reformulation were used, this decrease would not necessarily occur.

Table 29 reports the 1985 requirements projections for the baseline scenario and for three types of health systems changes. Here, too, the national projections presented earlier do not equal the sum of the State's projections. This occurs, in part, because of the application of uniform assumptions to the diverse State data. In addition, refinements of State data were made in instances where they would have an impact on the particular State but were not necessary to include on a national basis because they would have little overall impact.

The Anticipated Supply in States

As with projections of requirements, projections of State supply were based on the State's own distribution and trends in nurse supply, but also included national or centrally derived assumptions. However, unlike the requirements models, a State-specific model was developed that varies in certain elements from the model used to project the anticipated supply nationally. Part of this variation in modeling approach was due to the lack of certain data elements necessary to the amalgamation of the two approaches. Another component in addition to those used in the projections of national supply is needed to generate a State's supply: the important effect of migration. The State supply model takes migration into account through the use of registered nurse migration rates derived from a comparative analysis of individuals included in both the 1966 and 1972 Inventories of Registered Nurses. (Moses, 1976) The State in-migration and out-migration rates in that study were annualized for purposes of the State supply model. Such data do not exist for licensed practical nurses. Based on the differences noted in the multi-State licenses held by registered nurses and licensed practical nurses, the licensed practical nurses were assumed to migrate one-quarter as often as the registered nurses.

In deriving the projections of the supply by State, the assumptions made about future graduations on a national basis were made State-specific through the examination of the State's own nursing educational program trends but utilizing the general trends noted for the country as a whole. The application of the Series I premises about lack of Federal support, though, was uniform throughout the States.

State projections, unlike those at the national level, could not be made for registered nurses holding master's or doctoral degrees. Since master's degree graduates come from the already licensed population, they have to be deleted from a particular State's baccalaureate nurse complement and placed in the appropriate State's master's degree complement. Furthermore, although not all States have master's degree programs, all States benefit from master's degree graduates. For example, the data from the

1966 and 1972 Inventories of Registered Nurses indicated about a 50-percent increase in the number of employed nurses with graduate degrees during that time period. All but one State showed gains between the 2 study years, with 28 States having proportionate gains above the rate for the country as a whole. With respect to these 28 States, 9 were among the 17 States that did not produce any master's degree graduates within their own State in that period. On the other hand, the States of California, Massachusetts, and New York, which together produced 42 percent of the master's degree graduates in that 6-year period, showed gains in their employed graduate degree nurse complement that were proportionately below that of the country as a whole. In total, 19 of the 34 jurisdictions (including the District of Columbia), or 56 percent, with master's degree programs had gains proportionately greater than the country as a whole, and 9 out of the 17 without programs, or 53 percent, also had such gains. From these data, it can be seen that the presence of a master's degree program within a State is not a determining factor in a State's graduate degree nurse complement. Therefore, a set of data on the migration pattern of new master's degree graduates is needed. Nationally integrated data of this type is not currently available. Therefore, the State projections for registered nurses show two levels of educational preparation: those who have associate degrees or diplomas and those who have at least a baccalaureate degree.

Section 951 also calls for the projection of the supply of nurse practitioners by State. As in the case of registered nurses with graduate degrees, data currently available on the number of nurse practitioners preclude the making of such projections. A discussion of national estimates of the supply of nurse practitioners is included in the Nurse Practitioners section of Chapter 3.

Tables 30 to 37 present the State supply projections for registered nurses for selected years, and tables 38 and 39 show these data for licensed practical nurses. As in the requirements projections, there are differences between the national estimates of supply and the aggregation of the State data. Here the differences are related to both the individual effects of the model assumptions in each State, and the differences between the national and State model approaches.

Supply and Requirements--A Comparative Analysis

The State data reported here are the results of the first attempts to do an intensive analysis of requirements for nursing personnel in States from a national view. The State supply data are the second iteration of an evolving study of approaches to the development of estimates of supply in States. (The results of the first approach were reported in the First Report to Congress, February 1, 1977.) All of the approaches taken were premised on the basis of national norms, that is, centrally derived general assumptions and criteria were used in developing the projections. Although this has the merit of providing a uniform base for looking at all States, it can have the effect of causing all States to be measured on the basis of a national average.

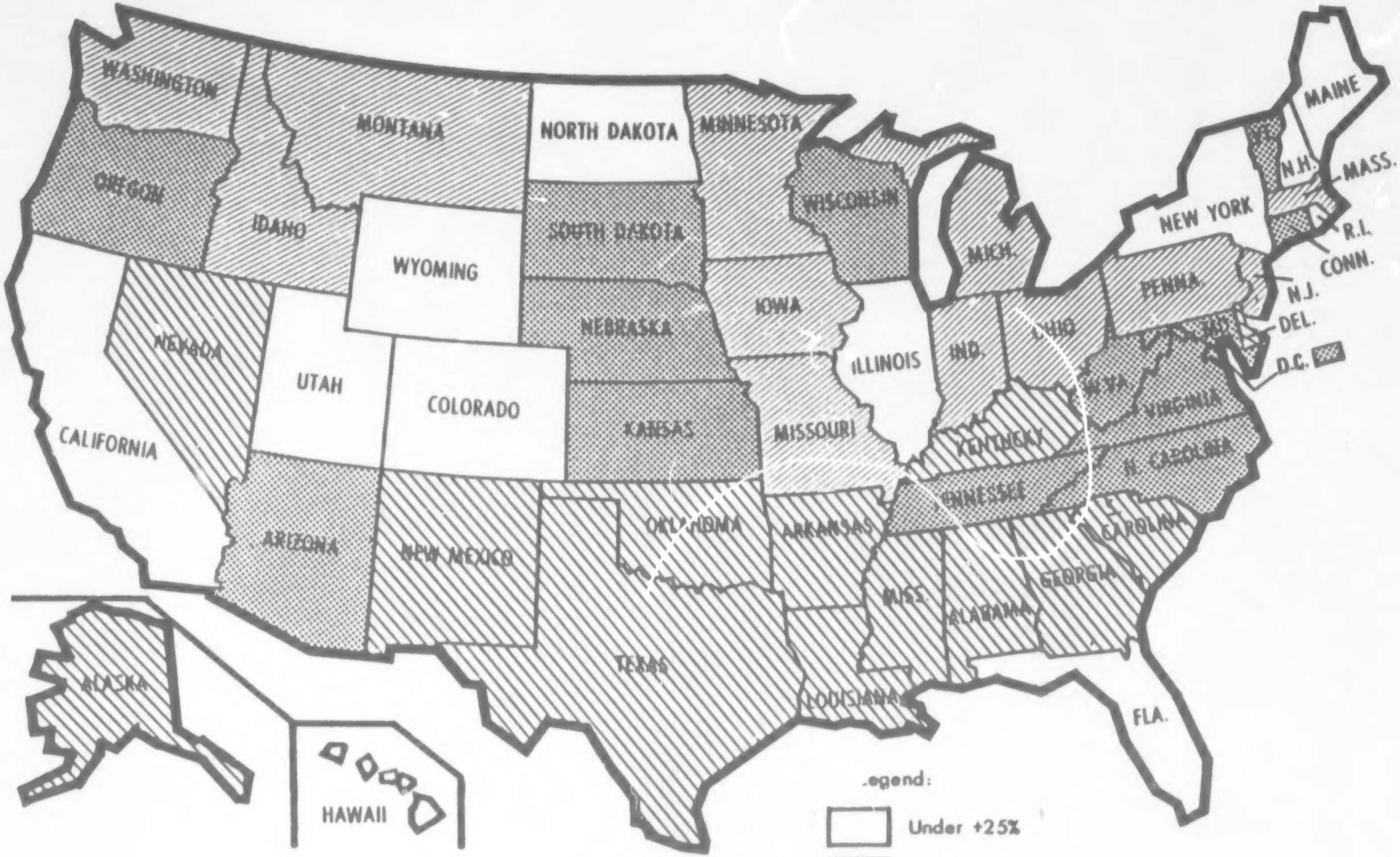
Important, too, was the fact that national, State-specific data bases were used to derive the trend data to which the assumptions and criteria were applied. Here, due to data availability, the year 1972 was critical. In the case of the requirements model prepared by Vector Research, Inc., increases noted for the projection period are based on this year. In the State supply model, the behavior pattern of registered nurses already in the licensed population depends not only on the distribution of nurses in 1972 but also on changes and movements noted between the years 1966 and 1972. Similarly, for licensed practical nurses, the distribution is based on 1974 data and the changes that occur between 1967 and 1974.

The third point to be considered is that both the requirements and supply data are dependent upon the data for the particular State in the national data base used. Thus, a review of the data would indicate projections of a critical imbalance between the supply of and the requirements for registered nurses in California. Examination of other data regarding the supply of registered nurses in California, including some very preliminary estimates of employed nurses from early data in the national sample survey of registered nurses, would indicate that the supply for that State might be somewhat underestimated.

Another point to consider in looking at comparisons of supply and requirements is that the effect may be a result of rather sizable increases in supply in projections for the future, rather than in small increases in requirements. The estimated percentage changes in the supply of registered nurses and licensed practical nurses from 1977 to 1985, as measured by full-time equivalent nurse-per-100,000-population ratios, is presented in figures 10 and 11, for the projection series that assume the maintenance of current trends and conditions. The magnitude of the gains estimated for registered nurse-to-population ratios generally exceed those for licensed practical nurses, as evidenced by the median gains of 31.9 and 22.6 percent respectively.

For registered nurses, the Northeastern, Northern and Western portions of the country show no particular trend, although both minimum and maximum gains in the nurse population ratios are represented throughout these areas. Of these three geographic areas, the Northeastern portion of the country is estimated to gain the least, with most States indicating gains of fewer than 30 percent. In contrast, the Southern and Southeastern portions of the country are estimated to attain the greatest gains, with only one State gaining fewer than 30 percent. These Southern and Southeastern States generally had relatively low registered nurse population ratios in 1972 in comparison with the rest of the country; in 1977 these States still have lower nurse-to-population ratios. These rates of gain may not reflect a dramatic improvement of the States in this area over those of the remainder of the country.

Figure 10.-- Percentage change in full-time equivalent registered nurses per 100,000 population from 1977 to 1985


WASHINGTON
MONTANA
NORTH DAKOTA
MINNESOTA
MAINE
OREGON
IDAHO
WYOMING
SOUTH DAKOTA
WISCONSIN
MICH.
NEW YORK
VT.
N.H.
MASS.
R.I.
CONN.
N.J.
DEL.
D.C.
MD.
PENNA.
NEVADA
UTAH
COLORADO
NEBRASKA
IOWA
ILLINOIS
IND.
OHIO
W.VA.
VIRGINIA
CALIFORNIA
KANSAS
MISSOURI
KENTUCKY
N. CAROLINA
TENNESSEE
S. CAROLINA
ARIZONA
NEW MEXICO
OKLAHOMA
ARKANSAS
MISS.
ALABAMA
GEORGIA
TEXAS
LOUISIANA
FLA.
ALASKA
HAWAII

Legend:

□ Under +25%

▨ +25% to +30%

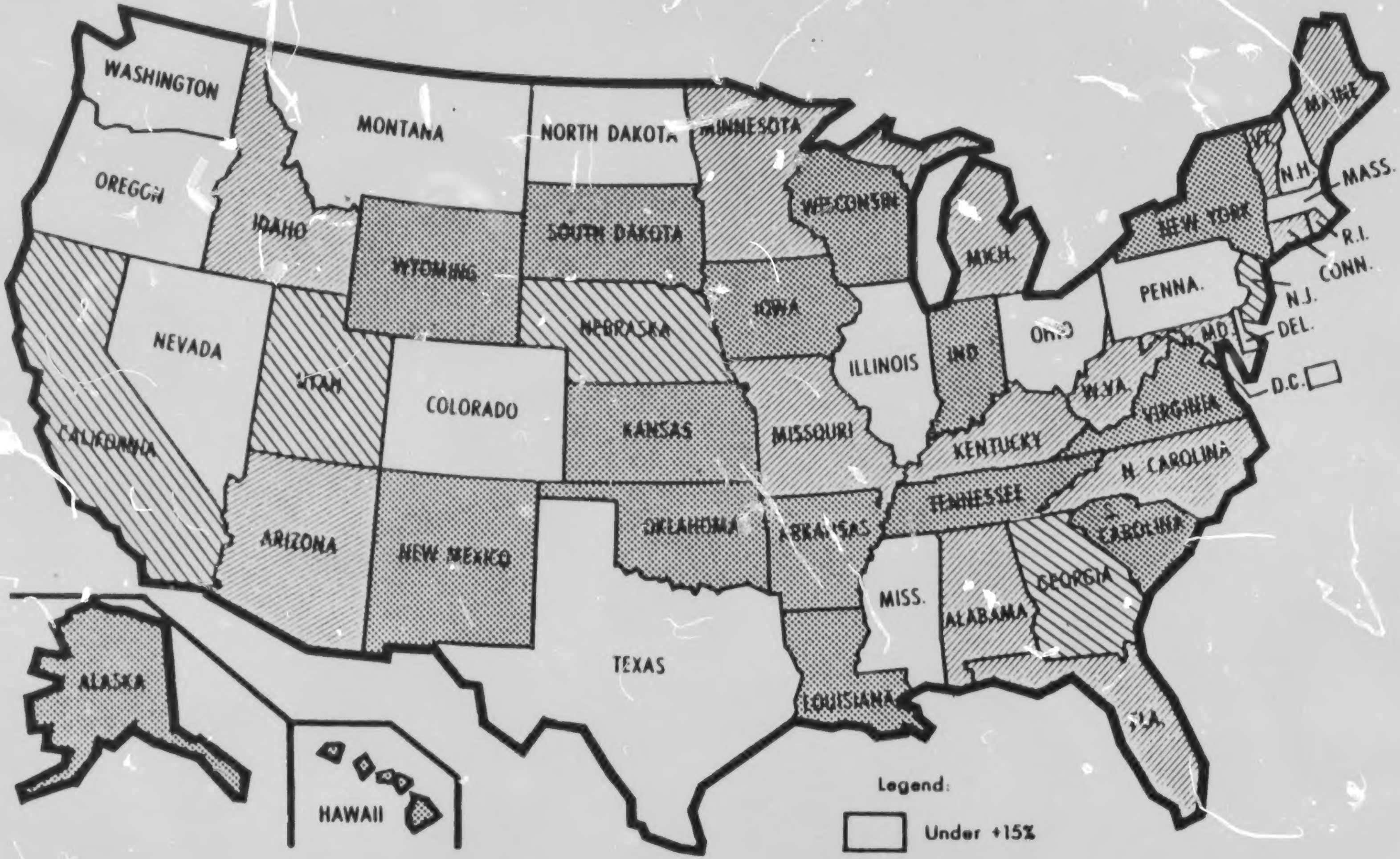
▩ +30% to +45%

▧ More than +45%

Median = +31.9%

Source: Estimates of supply of registered nurses prepared by Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare.
State population estimates projected by Vector Research, Inc.

Figure 11.-- Percentage change in full-time equivalent licensed practical nurses per 100,000 population from 1977 to 1985


WASHINGTON
MONTANA
NORTH DAKOTA
MINNESOTA
MAINE
VT.
N.H.
MASS.
OREGON
IDAHO
WYOMING
SOUTH DAKOTA
WISCONSIN
MICH.
NEW YORK
R.I.
CONN.
N.J.
DEL.
MD.
D.C.
PENNA.
NEVADA
UTAH
NEBRASKA
IOWA
ILLINOIS
IND
OHIO
W.VA.
VIRGINIA
CALIFORNIA
COLORADO
KANSAS
MISSOURI
KENTUCKY
N. CAROLINA
TENNESSEE
S. CAROLINA
ARIZONA
NEW MEXICO
OKLAHOMA
ARKANSAS
MISS.
ALABAMA
GEORGIA
TEXAS
LOUISIANA
FLA.
ALASKA
HAWAII

Legend:

- ☐ Under +15%
- ▨ +15% to +25%
- ▩ +25% to +45%
- ▧ More than +45%

Median = +22.6

Source: Estimates of supply of licensed practical nurses prepared by
Division of Nursing, Health Resources Administration,
U.S. Department of Health, Education, and Welfare.
State population estimates projected by Vector Research, Inc.

The data for the number of graduates from basic nursing programs between 1971-72 and 1975-76, upon which the estimates for the 1977 supply were based and which contributed in large measure to future year projections, show that the States in the South generally experienced the largest increases in graduations during that period. The 1966 and 1972 comparative study of registered nurses showed that the Southern area between 1966 and 1972 also generally experienced greater rates of in-migration than out-migration. These data contributed in a large measure to the changes shown in the projections. Thus, the rates of increase indicated are based on the assumption that these patterns would pertain for the future.

Overall, when the supply as projected in this report and the projected requirements as measured by the two modeling approaches are reviewed, a great deal of variation is noted to exist from State to State. However, the two sets of projections from the requirements models agree as to general direction of the balance between supply and requirements. The WICHE Panel of Expert Consultants took into account an increased use of registered nurse expertise, increased nurse staffing, and the provision of nursing services in areas where health services have not been available before (e.g., the community health area). An examination of the "lower bound" projections for 1982 from WICHE with those of the 1985 Vector model, which combined effects of liberal national health insurance and role reformulation coupled with HMO growth, shows agreement in the direction of the balance between supply and requirements for 38 of the States: 23 of these showed that requirements may exceed the projected supply; 14 showed that the projected supply may exceed requirements; and one showed little difference between the supply and requirements projections.

Of note, however, is the point that these data reflect the overall number of registered nurses in the supply and in the requirements. When the mix of educational preparation required for registered nurses was examined on a national basis against the anticipated supply of these groups, it was suggested that there would be an insufficient supply of those prepared at the baccalaureate level or above. The same result is apparent in all the States. Although projections of State-by-State supply of nurse practitioners could not be made at this time, the wide disparity between the estimates of requirements made by WICHE and the national supply estimate for these nurses would tend to suggest that the same picture would exist in all the States.

While the centralized approach has the virtue of comparability and objectivity, it does not permit consideration of certain local information that might not be available to the central source. Moreover, as the State Model process points out, there are important differences among State and local views of how health care should be organized, delivered, and financed.

For many years States and local areas have been conducting studies of nursing needs and resources. Approximately 200 such studies have been completed as of December 1977, including a number of studies that have been repeated at intervals of 5 to 10 years.

It is informative to compare the results of these studies with the projections of supply and requirements contained in this report, using the State Model requirements results. Data from seven recent studies are available. Three of these studies--New Mexico, New York, and Rhode Island--were conducted as pilot tests of the State Model. Therefore, there is among these a commonality of methodology in the requirements part of their studies, although assumptions and criteria used were determined by advisory committees in each of these States. The other four States--Missouri, Nebraska, New Jersey, and Virginia--conducted their studies independently and utilized different methodological approaches to the determination of both registered nurse future supply and requirements.

As the following list shows, there is remarkable agreement between the comparison of requirements from the State Model and the projected registered nurse supply for each of the seven States, and the supply/requirements comparison determined by the States themselves.

Comparison of RN supply and requirements projections

State	State Model estimates*	State's own estimates
Missouri	Requirements exceed supply	Requirements exceed supply
Nebraska	Supply exceeds requirements	Requirements exceed supply
New Jersey	Supply exceeds requirements	Supply exceeds requirements
New Mexico	Requirements exceed supply	Supply exceeds requirements
New York	Requirements exceed supply	Requirements exceed supply
Rhode Island	Requirements exceed supply	Requirements exceed supply
Virginia	Supply exceeds requirements	Supply exceeds requirements

In two States, New Mexico and Nebraska, there is a difference between the projections contained in this report and those derived by the States. In New Mexico, the explanation for this is a higher projection of future registered nurse supply by the State due to an assumption of considerable in-migration of registered nurses over the next few years. In Nebraska, while the projected supply determined by the State is not appreciably different from the projections included in this report, their review of their future service needs and the registered nurses required for these services differed from those of the State Model requirements estimates.

Distribution of Nursing Personnel Within States

While differences among States have importance in determining direction, differences within States or between local areas also have relevance, since it is at this level that services are actually delivered and received. It is possible that a State may present in the aggregate one picture of the balance between the delivery and the requirement for services but within the boundaries of that State a varying pattern would emerge. Two specific modeling approaches were developed to look at local area distribution. The first of these provides a comparative analysis of counties according to the distribution of registered nurses and the population served. The second examines the supply and demand for nursing personnel to determine the needs for such personnel.

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* Using Series II supply projections and lower bound of requirements projections.

Nursing Service Distribution Assessment Model

It has long been held that the geographic distribution of registered nurses is very uneven. Distribution has been traditionally measured by the ratio of nurses-to-population, which varies greatly from one area to another. However, this distribution measure has several limitations, the foremost being that it does not consider the population actually receiving services from nurses.

The Nursing Service Distribution Assessment model was developed under a contract with Information and Communication Applications, Inc., to analyze the distribution of registered nurses more definitively than was done in the past. The model estimates a ratio measure based on the number of registered nurses employed in all health care delivery settings that serve a population. This is called the adjusted ratio, in contrast to the ratio of nurses to the total population that is resident in the same geopolitical area in which the settings are located, which can be called the unadjusted ratio. The adjusted ratio, computed on a county-by-county basis, uses registered nurse data, demographic data, geographic data, and health care facilities data at the county level. The most temporally consistent set of data was employed in computing the adjusted ratio--1972 data for health facilities, manpower, and service utilization, and 1970 census data for population characteristics.

In the simplest form the model estimates the amount of registered nurse services provided by a county's health care delivery settings. It then estimates the proportion of those services used by nonresidents of that county, and the proportion used by the county's residents from settings located in other counties. These values are then used to calculate the net amount of services consumed by the residents of that county. The service estimates, when translated to full-time equivalent registered nurses, provide a better picture of full-time equivalent registered nurse services used by a county population, than the ratio based only on registered nurses employed in that county. The model derives these estimates by deterministic models and regression techniques that take into account patient-origin data and employment settings primarily serving only the county, those whose service is distributed statewide, and those serving multicounty areas.

Since the focus of the service model is on registered nurses providing health care services to the population, only those nurses employed in direct health care delivery settings are considered. Excluded from the analysis are nurses employed in research and administrative organizations and schools of nursing.

In the examination of the county data certain counties appeared to deviate from the general rule and the intercounty service flows appeared to be random and not capable of estimation by the model. These counties, for which reliable estimates could not be generated, were deleted from further consideration.

The results presented in tables 38 and 39 are the preliminary data for counties included in the initial exercise of the model. It is felt the adjusted ratios give a truer representation of the nursing services consumed by the residents of the counties than the unadjusted ratios. A total of over 84 percent of the counties in the United States are included in these data, and they contain nearly 93 percent of the total population. Excluded entirely are the States of Alaska and Hawaii and somewhat more than 400 counties within the continental United States. The results demonstrate two points: (1) differences occur between the nursing service thought to be provided to a county's population when the service is assumed to come only from those nurses employed within the boundaries of the county (unadjusted ratio) and the nursing service estimated to be provided to the county's population from employment settings both inside and outside the county (adjusted ratio); and (2) even with a truer picture of the nursing services provided to a county's population, the variability of the service ratios, although diminished, may still be unacceptably large.

The values of the unadjusted ratios (table 38) indicate that slightly over 25 percent of all counties included in the analysis have fewer than 100 full-time equivalent registered nurses per 100,000 population. Similarly, nearly 55 percent have fewer than 200, and over 77 percent have fewer than 300, while under 4 percent have over 500. However, on a population basis, only slightly over 5 percent of the population in counties included in the model exercise have fewer than 100 full-time equivalent registered nurses per 100,000 population, slightly under 28 percent have under 200, almost 49 percent have under 300, and more than 8 percent have over 500.

When the adjusted ratios are computed, the variability in nurse distribution becomes less extreme. Thus, in contrast to the unadjusted ratio in which some counties were estimated to receive no nursing services, using the adjusted ratio every county does have some nursing services either from its own area or from neighboring counties.

When the amount of nursing service provided to the counties' population is examined in the light of the adjusted ratios, the percentage of counties and county populations with fewer than 100 full-time equivalent registered nurses per 100,000 population decreases dramatically to under 1 and 2 percent, respectively. At the other end, the percentage of counties and county populations with ratios over 500 decreases to 3 percent. No county has a zero ratio, in contrast to the unadjusted ratio in which some counties were estimated to receive no service, but are always estimated to receive some amount of RN service from surrounding or neighboring counties.

In general, the extremes in the distributions are decreased as a result of the estimation process, but even with a refined measure, a wide range of nursing services provided to the population still exists. For example, over 18 percent of the county populations have fewer than 200 full-time equivalent registered nurses per 100,000 population, while nearly 17 percent have more than 400 full-time equivalent registered nurses per 100,000.

The estimation process is complex and encompasses many attributes of the counties. At present the method is being refined and further improved not only to address those counties not presently included in the model exercise, but also to improve the accuracy of the model.

Micro Model for Assessing Nursing Manpower Demand and Supply

The Nursing Service Distribution Model, by being based on nurse-to-population ratios, captures two essential differences that may occur in the delivery system. Since registered nurses, for the most part, require a facility or organized service setting in which to practice, a relatively low ratio could mean, for example, the absence of such facilities or services, or the delivery by registered nurses of a lower proportion of the services in these organized settings. A second model (Micro Model), to be described below, looks at these two effects separately. In reviewing that model, however, it is important to keep in mind the point made in the analysis of the effects of the Nursing Service Distribution Model. That is, whatever geographic unit of analysis is used, the flow of services from one geographic entity to another needs to be considered in determining the service needs of the populace.

The Micro Model for Assessing Nursing Manpower Demand and Supply was developed by Community Systems Foundation, Ltd., under contract with the Division of Nursing, to project nursing supply and demand at the sub-State level for four provider settings: acute care, long-term care, ambulatory, and public health. The Micro Model that has been developed consists of three submodels:

- Health services utilization;
- Nursing manpower demand, which uses outputs of the health services utilization submodels to estimate the associated demand for nursing manpower;
- Nursing manpower supply.

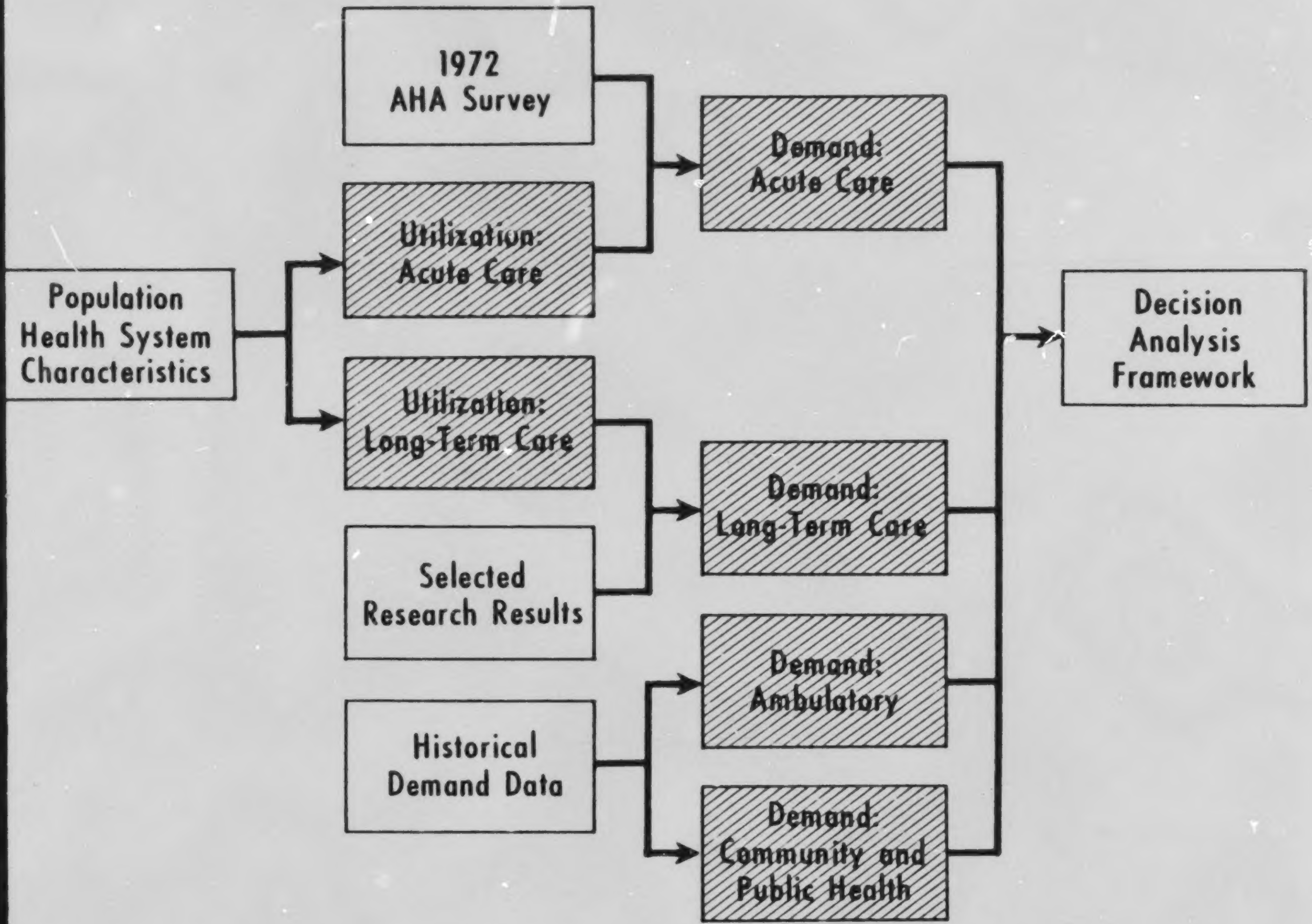
In the health care utilization component, submodels were developed for acute and long-term care. These submodels are causal in that the outputs are determined by independent or predictor variables identified through statistical analysis. Step-wise multiple regression was used to develop the utilization submodels. Acute care institutions were categorized by four major characteristics (1) bed size, (2) control, (3) level of technology, and (4) teaching or nonteaching. Long-term care institutions were categorized by bed size and control. Regression equations were determined for each category of institution for which sufficient data existed. Twenty different acute care models and eight long-term care models were developed. The regression analysis resulted in 29 variables being selected as predictors, out of a total of 73 independent variables and 42 possible institutional variables. A specific model contains four to seven of the variables.

The nursing manpower demand submodels convert health services utilization estimates, i.e. inpatient days, for acute and long-term care institutions, to demand for nursing manpower in man-hours or full-time equivalents (see figure 12). Demand is estimated for three types of nursing personnel: (1) registered nurses, (2) licensed practical nurses, and (3) nursing aides and orderlies.

Data were not available to allow for the development of health services utilization models for ambulatory and community and public health settings. The methodology for projecting the nursing demand in these areas was based on least squares linear projection of historical data. The basis for the nursing manpower supply submodel was the model developed by the Research Triangle Institute mentioned previously (Jones, et al., 1976).

A summary of the main features of the submodels that are incorporated into the Micro Model are shown in figure 13. These models were tested and evaluated in one State (New Mexico), one metropolitan area (District of Columbia), and one Health Systems Agency (Madison, Wisconsin). The supply and demand for nursing personnel were projected for the years 1975 to 1980.

Figure 12.-- Overview of the Micro Model


1972 AHA Survey
Utilization: Acute Care
Population Health System Characteristics
Utilization: Long-Term Care
Selected Research Results
Historical Demand Data
Demand: Acute Care
Demand: Long-Term Care
Demand: Ambulatory
Demand: Community and Public Health
Decision Analysis Framework

ource: Gue et al., A Micro Model for Assessing Nursing Manpower Demand and Supply, Final Report, Community Systems Foundation, Ltd.

Figure 13.--Selected submodel features

Submodel	Type	Provider setting	Input data	Lowest level of output	Output data
Utilization	Causal	Acute, long term	Population institutions and health systems characteristics	Institution	Patient days or procedure
Demand	Empirical	Acute	1972 ANA Inventory, utilization output	Institution	Full-time equivalents per patient day
Demand	Empirical	Long term	Selected research results, utilization output	Institution	Full-time equivalents per patient day
Other demand	Projection	Ambulatory, community and public health	Historical demand data	County	Full-time equivalents
Supply	Causal	All	Projections of survival probabilities: New graduates, new foreign, reinstatements and migration, activity rates.	County	Full-time equivalents

Source: Gue, et al., A Micro Model for Assessing Nursing Manpower Demand and Supply, Final Report. Community Systems Foundation, Ltd., 1977.

Results obtained for the District of Columbia metropolitan area are shown in tables 40-42. Table 40 shows that the demand for registered nurses increases from a little under 10,000 full-time equivalents in 1975 to a little over 15,000 in 1980. Supply is predicted to increase from a little over 10,000 to nearly 13,000 in 1980. Thus, from what appears to be balance between supply and demand in 1975, a shortage of over 2,000 full-time equivalent registered nurses is projected for 1980.

The gap between supply and demand for licensed practical nurses also widens during this 5-year period. A shortage of under 500 full-time equivalent licensed practical nurses in 1975 grows to nearly 2,000 in 1980.

Table 40 pinpoints the care settings where greatest growth in demand is predicted to occur. Numerically, this will be in acute care settings, which by 1980 are predicted to increase in registered nurse demand by nearly 5,000 and in licensed practical nurse demand by 1,500.

The District of Columbia metropolitan area provided a rigorous test of the Micro Model. The area includes multiple governmental jurisdictions and several counties in Virginia and Maryland. It encompasses four health planning jurisdictions and a variety of nursing agencies and licensing boards. Sensitivity testing of the model's results give confidence in the projections of nursing demand and supply and in the applicability of the model to other sub-State areas in the Nation.

Chapter 6

CONCLUSIONS ABOUT AGGREGATE NATIONAL SUPPLY AND REQUIREMENTS

Estimating future requirements for nursing personnel, as for other health professionals, is an extraordinarily complex process. As this Second Report to the Congress indicates, nursing personnel are used throughout the health care structure in many different capacities, at many different levels, and in many different settings. Their roles span health teaching and counseling, the prevention of illness and the maintenance of health, as well as care of the sick at home, in ambulatory care centers, and in institutions. Registered nurses perform a wide variety of functions and responsibilities including those areas in which the registered nurse acts in an assisting or collaborative relationship with other health practitioners and areas in which the registered nurse provides leadership through administering or supervising nursing activities or through teaching nursing students or other health care students and practitioners. The complexity and variety of nursing "models" developed reflect these diversities. Thus, nearly all aspects and settings of health care have to be touched upon and examined in estimating requirements.

In addition to the above considerations, the different definitions of usages of the term "requirements" adds another level of complexity to model development and estimation of manpower requirements. Requirements can be considered in terms of "need"--the number of RN's that expert judgment believes is appropriate to provide a state of health consonant with existing knowledge. Requirements can also be estimated in terms of "want"--the quantity of services the population feels it ought to consume given its own perceptions of health care needs. Furthermore, requirements can also be thought of in terms of "demand"--the quantity of services that would be consumed depending upon prices of goods and services, financial resources, and size and psychological wants of the population as reflected by consumers' taste and preferences for all goods and services. However, in most requirements estimations the critical factor is often the assumptions made about changes in the utilization of health manpower, which in turn are related to the dynamics of the specific occupation being studied. Since prospective requirements for nursing personnel are dependent both on how nurses will be used within the health care structure and on possible reorganizations or other changes that might occur within the health care system, a multiplicity of alternatives have been explored under these concepts and many specific assumptions used in developing the detailed requirements estimates.

The report describes three aggregate modeling efforts to project nursing requirements, including a wide array of assumptions which could have an impact on the aggregate requirement for nurses.

Two of the models, those developed by Pugh-Roberts and Vector are essentially "demand based" models with national projections. The third model, developed by the Western Interstate Commission for Higher Education (WICHE) was developed for use as a planning tool, at the statewide level. A more detailed discussion of WICHE and its limitations are incorporated in the Report.

Of the assumptions in the two national models, some reflect a more realistic view of demographic changes and possibly some growth in organized practice settings. Other assumptions are highly speculative, anticipating changes in the health care system which are inconsistent with current Administration policies and are unlikely in the context of the present health care system. For example, it is unrealistic to assume that by 1985 or 1990 the health care delivery system will change in ways which would dramatically increase utilization of health care services since the nation is becoming more cost-conscious.

Current policies promote ways to restrain unnecessary growth in the health care system. Moreover, the immediate implementation of broad based national health insurance with no or limited patient cost-sharing, assumed in some estimates for both national models, is clearly an unlikely assumption.

The Pugh-Roberts and Vector models are briefly summarized below, with their resulting requirements projections.

1. A Model of National Supply and Requirements for Nursing Personnel--Pugh-Roberts Associates, Inc./System Dynamics

This effort is directed from a national perspective primarily toward analysis of the multiplicity of factors that affect nursing requirements and resources and their inter-relationships. The technique used for the development of this model, known as Systems Dynamics, describes a set of causal relationships responsible for changes in pertinent variables in an attempt to understand better the factors influencing nursing variables. Among these variables or assumptions are staffing levels per hospital patient, RN's required per ambulatory visit, nursing home beds, breadth of nurse responsibilities, availability of scholarships and loans, and perceived availability of jobs in nursing. A Task Force assisted in the development of parameters for the model, focusing on the expanded role and responsibility of nurses over the next decade.

The primary use of the model is to examine, through simulation techniques, the variable effects of a variety of changes in nursing and in health care on other variables such as expanded utilization of nurses and the delivery of services, the adoption of a "liberal" system of national health insurance (NHI) with significant increases in the demand for inpatient, outpatient and home health care and growth in hospital and nursing home beds, as well as the impact of changes in nursing supply on requirements and vice versa. The

Pugh-Roberts model provides projections to the year 1990 (as well as the earlier years), using various simulations of the health care system. However, these estimates do not take into consideration the potential impact of strong cost containment efforts, utilization review, introduction of second opinion requirements, and other recent technological changes in the health care system.

The following summarizes the major assumptions built into the three key simulations:

- Historical Trends Projected into the Future (Baseline): The baseline assumptions involve no major changes in the health care delivery system, with changes in demand for nurses derived from a projection of historical trends for training capacity, scope of nursing responsibilities, nurse staffing and ambulatory care patterns, and institutional expansion. For example, short-term hospital beds increase by 24 percent, long-term hospital beds decrease by 58 percent, staffing level per inpatient increases by 22 percent and demand for public health nurses increases by 67 percent.

- Liberal National Health Insurance: Assumptions pertain to (1) moderate increases in utilization of hospitals and nursing homes; (2) significant increases in demand for services at home and in ambulatory settings; (3) growth in the number of hospital and nursing home beds beyond the baseline.

- Significant Expansion of Nurse Roles and Responsibilities: (1) significantly increased responsibilities of nurses in both hospital and ambulatory care settings; (2) increased staffing levels in hospitals; (3) more rapid growth in the proportion of RNs employed in both hospitals and nursing homes.

The following indicates the Pugh-Roberts derived requirements from each of the above simulations.

Simulation	Requirements for RN's	
	1985	1990
Historical Trends Projected into the Future (Baseline)	1,344,300	1,570,700
Liberal National Health Insurance	1,502,000	1,696,300
Significant Expansion of Nurse Roles and Responsibilities	1,614,200	1,884,800

2. An Analysis of the Impact of Nurse Manpower Requirements on Changes in the National Health Care System -- Vector Research, Inc.

The Vector Research model assesses the impact of three anticipated changes in the health care system on the requirements for nurses: (1) introduction of national health insurance, including the alternatives of a "moderate" and "liberal" program; (2) increased enrollment in health maintenance organizations; and (3) expanded roles for and increased utilization of RN's. The approach taken was one in which a baseline projection was made assuming a "status quo" situation, with specific impacts of the factors mentioned -- national health insurance, HMO's and increased utilization -- examined in relation to this baseline.

Key projection scenarios are as follows:

- Baseline. Assumptions are: No system changes are assumed to occur in the health care delivery system -- no NHI, no new HMO growth, and no significant changes in nurse roles.
- Minor System Changes. Major assumptions include: health insurance remains at current levels; minimal new HMO growth; only minor changes occur in nurse roles.
- Moderate System Changes. Major assumptions include: NHI fully implemented by 1981, with cost-sharing similar to that for the currently insured population (5 percent for inpatient and 27 percent for ambulatory care); moderate HMO growth (34 new HMOs established by 1985); moderate expansion in nurse roles (including 65 percent of unmet ambulatory care needs satisfied by nurse practitioners).
- Liberal System Changes. Major assumptions include: universal, free and unlimited health insurance for the entire population fully implemented in FY 1981; substantial HMO growth (10.6 percent of population enrolled by 1985); significant changes and expansion in nurse roles (emphasizing hospital "primary nursing" concept for RNs, more clinical nursing specialists, and 100 percent of unmet ambulatory care needs satisfied by nurse practitioners).

The requirements based on Vector Research assumptions are as follows:

	1985 Requirements for RN's*	
	Moderate Estimates	Liberal Estimates
No changes in the System (Baseline)	1,187,200	
Minor System Changes (No NHI)	1,205,600	
National Health Insurance	1,248,700	1,392,000
Increased Utilization of RNs	1,198,600	1,408,900
Increased Utilization of HMOs	1,177,900	1,168,800
Combined Impact of the Above Three Factors	1,316,300	1,716,400

* Although the data from the study are usually presented in FTE's, they are shown here in terms of total number of nurses for ease of comparison.

As can be seen, the two requirements models provide a wide range of projections for registered nurse requirements estimates. Although it is important to understand these estimates, their derivation, and their assumptions, it is equally important to compare these estimates with the projected RN supply to assess the extent to which requirements and supply may or may not be in balance in the future. To make this comparison the Series I and Series II supply estimates contained in this report are used. Series I provides estimates of the number of registered nurses should Federal support for basic nursing education be discontinued and Series II provides estimates under maintenance of "current conditions and trends" in Federal support for basic nursing education.

Since both Pugh-Roberts and Vector Research examined requirements for 1985 and both are essentially based on a "demand" definition of the term "requirement", the results of these two models are used here to examine the possible future supply/requirements balance. The following briefly demonstrates the range of projected requirements based on varying assumptions of changes in the total care delivery system:

	Total number	Full-time equivalents	Total number	Full-time equivalents
	REQUIREMENTS			
	Pugh-Roberts		Vector	
Baseline	1,344,300	1,142,700	1,187,200	1,003,100
With National Health Insurance:				
Moderate	--	--	1,248,700	1,055,100
Liberal	1,502,000	1,276,700	1,392,000	1,176,100
Increased utilization of RN's:				
Liberal	1,614,200	1,372,100	1,408,900	1,190,400
Minor System Change (No NHI)	--	--	1,205,600	1,012,700
Combination of NHI, Increased utilization and expansion of HMOs:				
Moderate	--	--	1,316,300	1,112,200
Liberal	--	--	1,716,400	1,450,300
	SUPPLY			
Without continuing Federal support	1,345,000	1,135,000		
With Federal support	1,380,000	1,166,000		

The range of requirements is clearly shown. In general, Vector Research, Inc. tended to show a more conservative set of numbers than did Pugh-Roberts. In part, this is due to different baseline estimates, with Pugh-Roberts establishing a higher baseline than Vector Research. In analyzing these models, one should be cognizant of the fact that 1972 data were the latest available information on a national basis. Pugh-Roberts modified this data through the use of a consultant group primarily comprised of registered nurses to postulate anticipated changes in the health care system which would have an impact on the demand for RNs. This, plus differing assumptions and approaches, accounts for the differences in data results.

The overall RN requirements range projected for 1985 is between 1,205,600 and 1,716,400, encompassing the "minor system change" and the "liberal system change" scenarios developed by Vector Research. The "most likely case", based on an assessment of the model's assumptions compared with prevailing conditions in the health care system and current policies, yields a requirement range between 1,205,600 and 1,316,300 RNs and probably at the lower end of the range. Therefore, it is concluded that the aggregate national requirements and supply for 1985 will be in balance.

This conclusion regarding the adequacy of RN supply in 1985 is also based on the following:

- A national health plan, when enacted, will require a lead time of two to three years before initial implementation and additional coverage and benefits are likely to have a phase-in period of several additional years.
- The cost-sharing provisions of a national health plan are likely to be greater than assumed in the "liberal system change" NHI model and may even be higher than the co-payment level incorporated into the "moderate system change" NHI model.
- Substantial changes in nurse roles and responsibilities which would lead to significant increases in nurse requirements are also unlikely.

Therefore, on balance, the most reasonable view is that in 1985 the aggregate supply of nurses will be roughly equal to the aggregate requirements. These data are for the country as a whole and for all RNs treated as a homogeneous group without regard to functional or hierarchical specialization. Maldistribution might continue to exist in certain areas of the country, in certain nursing settings, and among certain types of registered nurses.

Chapter 7

SUMMARY

This is the second report to the Congress submitted by the Secretary of Health, Education, and Welfare in response to the directive in section 951 of Public Law 94-63 for data on the supply and distribution of and requirements for nurses.

The supply of registered and licensed practical nurses is that number available for employment at a particular point in time. This depends not only on those educated and licensed to practice, but also on those willing to practice. As of January 1977, the estimated number of registered nurses actively employed was 1,011,000. The estimated number of licensed practical nurses actively employed was 498,000.

Among registered nurses, 797,400 were prepared at the diploma or associate degree level; 175,800 at the baccalaureate level; and 37,800 at the master's degree level or higher.

While more than a million registered nurses were estimated to be employed in January 1977, the full-time equivalent number was 854,000 because of the large number of nurses who work part time. Of this number, 664,800 were diploma and associate degree graduates; 153,900 were baccalaureate graduates; and 35,400 were master's degree graduates or higher. At the same time, a full-time equivalent of 437,000 licensed practical nurses was actively employed.

Additions to the population of nurses stem not only from licensed graduates of nursing schools, but also from the foreign nurse graduates who qualify for licensure. Approximately 8,000 graduates of foreign nursing schools enter this country annually. Studies show, however, that only a portion of these succeed in becoming licensed. Reductions in the total population of nurses are due to mortality or to lapses of licenses for other reasons.

Graduations from generic registered nurse education programs have increased markedly in the recent past from 34,497 in the 1964-65 academic year, to 77,065 in the 1975-76 academic year. This increase, plus an increase in the proportion of the nurse population who were employed in nursing, has resulted in relatively high growth rates in the registered nurse supply. The report shows that even with this growth, registered nurses are being absorbed into the work force at a high rate. A 1974 study of experienced nurses showed that only 2.3 percent of the total registered nurse population were unemployed and actively seeking work. A 1976 study of newly licensed registered nurses showed the same low rates. The proportion of unemployed nurses is considerably lower than that for the entire U.S. labor force.

The employment situation for licensed practical nurses is somewhat different. Growth rates for the licensed practical nurse supply and the number of new graduates are not as large as for registered nurses. Yet the report shows that whereas in 1973, 3 percent of newly licensed practical nurses were looking for work, in 1976 the rate had increased to 5.8 percent.

Approximately two-thirds of the nurse supply is employed in hospitals. Despite the increased supply of registered nurses many hospitals continue to report difficulty in recruiting and retaining the numbers they require. During the prolonged shortage of registered nurses, hospitals and other agencies resorted to the substitution of lesser trained nursing personnel. The present picture of continued high employment rates for registered nurses in a time of increasing supply, and an increasing unemployment rate for licensed practical nurses, indicates a reversal of this practice.

In addition to information on the nurse supply, including geographic distribution, the report also provides a range of information on future national and State requirements from a number of different models. This presentation of a range for considering requirements was selected because there is no simple answer to the complex problem of predicting future requirements. The Vector model assessed the impact of three anticipated changes in the health care system on the requirements for nurses: (1) the introduction of national health insurance; (2) the increased enrollment in health maintenance organization; and (3) the reformulation of nursing roles. These assessments were made through the year 1985 on a national and State basis. The System Dynamics or national Model analyzed factors affecting national nursing requirements and resources from the present through the year 1990. The WICHE (Western Interstate Commission for Higher Education) State Model was designed to provide techniques to determine nursing resources and requirements at the State level. Working with a Panel of Expert Consultants, WICHE made projections of requirements for nursing personnel at national and State levels for 1982. A fourth model, the Micro Model, was designed to produce sub-State estimates of supply and demand from which to estimate the need for the various types of nursing personnel. The model was not applied at national and State levels. However, it was tested in three areas, and the data from one of these is included in this report.

To project and examine the future supply of nurses, the Division of Nursing developed two models, discussed in the report. One was geared to data available on a national basis, the national supply model, and the other to data available in nationally integrated data sources on a State-by-State basis, the State supply model. The two approaches were needed to facilitate the preparation of various levels of supply projections necessary for appropriate determination of future nursing resources.

The objective of the studies and analyses reported was to provide a more definitive statistical and analytic basis on which to discuss the preparation, deployment, and utilization of nurses for the country as a whole and for the individual States, and thereby to facilitate long-range planning for the national nurse supply. Underlying the several studies, the thinking of experts, and the analyses, was the concept of better health for all segments of the population, and an adequate and prepared nurse supply; that is, nurses skilled in the concept and practice of nursing management necessary for helping clients remain well, regain health, or cope with the problems of disease or disability.

Nurse training assistance under Title VIII of the Public Health Service Act has undoubtedly contributed to increasing the supply of nurses and improving the quality of education at a time when profound changes have been occurring in nursing education and practice. The social and economic forces which affected general education in the years following World War II have also had a significant impact on nursing education. The early 50's witnessed marked efforts by hospital-based diploma programs to improve the quality of their educational programs. For example, many of the basic science courses, previously taught by school of nursing faculty, were instead obtained through contractual arrangements with educational institutions, and increased hours of classroom instruction reduced the amount of time spent by students in providing nursing service. As a result, the character of hospital-based programs became more general, preparing students for entry into the labor market as opposed to preparing them for service in the institution offering the training. In order to staff patient units, hospitals resorted to employing greater numbers of graduate staff. The increased costs of providing an educational program coupled with expense of staffing patient services made operation of hospital-based programs a costly undertaking. Ultimately, a proportion of these costs was borne by the patient either directly or indirectly through third party reimbursement mechanisms. Costs associated with operating educational programs in institutions whose primary mission was service precipitated the closing of hospital-based programs. Over the past decade the number has decreased at a rate of approximately 30 to 40 programs each year. Cost was not the only factor, however, accounting for the closing of diploma programs. The immediate post-war years witnessed increasing enrollments of high school graduates and returning veterans in colleges and universities. This trend applied as well to nursing education.

Enrollments in baccalaureate programs increased, reducing somewhat the reservoir of students from which hospital-based programs had previously recruited. New baccalaureate programs were established in response to interest in a type of preparation that combined general and professional education. Growth in this segment of nursing was limited primarily by the availability of faculty who could meet university criteria for appointment. The most marked growth occurred in the number of associate degree programs. This increase was, in part, a conscious effort to meet a social goal of placing nursing programs within the reach of individuals who could not undertake baccalaureate education either because of financial reasons or because of their need to remain in their home communities.

However, the growth in the number of schools and the size of enrollments has been disproportionate to the availability of clinical resources. While innovative uses of educational technologies have been adapted to the needs of nursing programs, there is no substitute for supervised clinical practice. Since many associate degree programs were located in small communities, the number of facilities in which clinical experiences could be obtained was limited. The availability of faculty, which had been in short supply in 1964, was stretched still further as the number and size of programs grew, and schools were often forced to employ faculty with inadequate preparation.

The authorities and funds under Title VIII of the Public Health Service Act have brought about improvements in the quality of educational programs as evidenced by the increase in those which have achieved national professional program accreditation. From 1964 to 1976, the percentage of associate degree programs that were so accredited increased from 4 to 46; of baccalaureate programs, from 71 to 90. Of the remaining diploma programs, 90 percent are accredited as compared with 68 percent earlier. Of considerable significance is the fact that nursing schools have become aware that educational programs and the composition of the student body must be more responsive to and representative of the total population to be served. This trend, too, was largely stimulated and fostered by nurse training act funds.

Despite the shift in nursing education toward academically based nursing programs, the supply of nurses for the next several decades will be mainly composed of graduates of hospital-based and associate degree programs, both of which prepare nurses for institutional service. However, the changes which have already taken place in the health care delivery system together with those which can safely be predicted dictate a need for nurses prepared for practice in ambulatory care settings.

This preparation is provided only in programs leading to a baccalaureate degree. Indications are that, if present nursing educational trends continue, the number of graduates from basic baccalaureate nursing programs will increase considerably over the next thirteen years. However, by the 1988-89 academic year, they will constitute less than half of the total number of new nursing graduates. The effect on the overall nurse supply, taking into account both the baccalaureate graduates from generic programs and those registered nurses who subsequently receive baccalaureate education is not dramatic. The proportion of the nurse supply with at least a baccalaureate degree is estimated to be 33 percent for 1990. In 1977, it was 21 percent.

Review of the education requirements for registered nurses determined by analysis to date and the distribution of the anticipated supply reveals a wide disparity. The report shows that projected requirements for nurses with at least the baccalaureate surpass the anticipated supply of such nurses, while requirements for nurses at the associate degree or diploma level are below the current as well as the anticipated supply.

A related issue is the extent to which there is a need for prepared faculty, administrators, researchers, and clinicians. Further study is now required to determine the future supply and requirements for these nursing personnel. However, a 1976 National League for Nursing study on faculty preparation, for example, shows that 58 percent of faculty in programs preparing registered nurses had master's degrees, and fewer than 5 percent had the doctorate (National League for Nursing, 1976). It is anticipated that, with the maintenance of present conditions, the supply of nurses with master's or doctoral degrees will increase 131 percent by 1990, to constitute 6 percent of the anticipated full-time equivalent supply.

Furthermore, the number of programs preparing for clinical and functional specialization has grown slowly but steadily as the number of prepared faculty has increased to enable expansion. Of the 60 approved applications for advanced nursing education funded since June of 1976, the overwhelming majority are for programs at the master's level. Growth in the number of doctoral programs has been much slower, again reflecting the availability of faculty prepared to teach at this level.

This report is also responsive to the expressed interest of the Congress for information on the current and projected supply of nurse practitioners. Until more precise and objective evidence is available regarding the extent to which nurse practitioners can be effectively utilized in various health care settings, it is premature here also to make definitive statements about requirements. Preliminary evidence from the results of the WICHE requirements estimates does suggest that the number who can be prepared by 1982 will fall short of the requirements. In determining the extent to which Federal resources should be invested in training specifically for nurse practitioners, however, consideration must be given to a number of related questions, including but not limited to reimbursement for services by third-party payers, interactions between and need for all primary health care providers, and revisions in State nurse practice acts to facilitate role expansion.

Still another concern of the Congress addressed in this report is the matter of geographic distribution of nurses. Data in the report points to an uneven distribution. However, the distribution of the nurse supply depends on the availability of settings for practice, the willingness of nurses to locate in the area, and other factors not addressed in this document. The presence of a nursing education program, for example, may not ensure that nurses will practice in the locality in which they receive training. Furthermore, the location of a nursing education program must be determined by the availability of appropriate clinical resources and the availability of qualified nurse faculty.

The analyses undertaken to date raise certain issues in nursing education which, as described above, need to be incorporated in any integrated health professions analysis. Although the aggregate supply of nurses appears to be adequate to meet future needs if the nature of the health care delivery system remains unchanged, there are distributional problems in terms of meeting apparent needs for certain types of nursing personnel. Therefore, careful consideration will be given to the extent to which nursing education needs redirection. The anticipated demand for services as a result of assumed national health insurance scenarios, and shifts in the delivery of health care from institutional to ambulatory and home care settings, would require nurses skilled in assessing health status, in applying techniques to maintain health and prevent illness, and in assisting individuals and families to cope with the effects of illness and disability. Pressures to control escalating costs of hospital care, furthermore, might encourage greater use of nursing homes, rehabilitation centers, and convalescent care facilities, where nurses are the primary providers of care and assume responsibility for its management over time. In acute care settings the complexities of care and the use of sophisticated treatment modalities assumed in the analyses would further point to consideration of the need for nurses with advanced preparation in special areas of practice.

Subsequent reports will provide additional information on the supply, distribution of, and requirements for nurses, and will provide further analyses of the issues raised in this report.

Appendix I.

PART D—MISCELLANEOUS

INFORMATION RESPECTING THE SUPPLY AND DISTRIBUTION OF AND REQUIREMENTS FOR NURSES

SEC. 951. (a)(1) Using procedures developed in accordance with paragraph (3), the Secretary of Health, Education, and Welfare (hereinafter in this section referred to as the "Secretary") shall determine on a continuing basis—

(A) the supply (both current and projected and within the United States and within each State) of registered nurses, licensed practical and vocational nurses, nurse's aides, registered nurses with advanced training or graduate degrees, and nurse practitioners;

(B) the distribution, within the United States and within each State, of such nurses so as to determine (i) those areas of the United States which are oversupplied or undersupplied, or which have an adequate supply of such nurses in relation to the population of the area, and (ii) the demand for the services which such nurses provide; and

(C) the current and future requirements for such nurses, nationally and within each State.

(2) The Secretary shall survey and gather data, on a continuing basis, on—

(A) the number and distribution of nurses, by type of employment and location of practice;

(B) the number of nurses who are practicing full time and those who are employed part time, within the United States and within each State;

(C) the average rates of compensation for nurses, by type of practice and location of practice;

(D) the activity status of the total number of registered nurses within the United States and within each State;

(E) the number of nurses with advanced training or graduate degrees in nursing, by specialty, including nurse practitioners, nurse clinicians, nurse researchers, nurse educators, and nurse supervisors and administrators; and

(F) the number of registered nurses entering the United States annually from other nations, by country of nurse training and by immigrant status.

(3) Within six months of the date of the enactment of this Act, the Secretary shall develop procedures for determining (on both a current and projected basis) the supply and distribution of and requirements for nurses within the United States and within each State.

(b) Not later than February 1, 1977, and February 1 of each succeeding year, the Secretary shall report to the Congress—

(1) his determinations under subsection (a)(1) and the data gathered under subsection (a)(2);

(2) an analysis of such determination and data; and

(3) recommendations for such legislation as the Secretary determines, based on such determinations and data, will achieve (A) an equitable distribution of nurses within the United States and within each State, and (B) adequate supplies of nurses within the United States and within each State.

(c) The Office of Management and Budget may review the Secretary's report under subsection (b) before its submission to the Congress, but the Office may not revise the report or delay its submission, and it may submit to the Congress its comments (and those of other departments or agencies of the Government) respecting such report.

Appendix II.

TABLES

Table 1.--Requirements for full-time equivalent registered nurses in the United States as a whole, according to various health system changes for selected years 1980-1985

Health system changes 1/	Full-time equivalent registered nurse requirements		
	1980	1982	1985
Combination of "more liberal" National Health Insurance plan, extensive "role reformulation for registered nurses" and "high" HMO growth	1,173,000	1,276,400	1,450,300
"Role reformulation for registered nurses"			
"Low"	878,500	930,000	1,012,700
"High"	951,600	1,038,100	1,190,400
HMO enrollment growth			
"Moderate"	870,400	918,600	995,200
"High"	867,500	914.100	987,600
National Health Insurance			
"Less" liberal	919,500	971,700	1,055,100
"More" liberal	1,031,800	1,087,300	1,176,100
None of these health system changes	873,600	923,400	1,003,100

1/ See chapter 1 for description of health system changes.

Source: Doyle, et al., The Impact of Health System Changes on the Nation's Requirements for Registered Nurses in 1985, Division of Nursing, HRA, PHS, DHEW Publication No. HRA 78-9, 1978. In press.

Table 2.— Results of the baseline simulation in "System Dynamics" model

	1972	1980	1990	1972-1990 (Percent change)
Total licensed RNs	1,127,940	1,556,910	2,000,700	77
RN demand	868,630	1,155,000	1,570,690	81
RN employment	795,260	1,088,330	1,459,100	83
RNs seeking employment	67,100	154,240	142,880	113
Licensed LPNs	544,000	766,060	939,130	73
Employed LPNs	427,000	466,060	502,450	18
RNs with associate degrees	53,630	261,020	500,490	833
RNs with diplomas	894,960	956,640	920,360	03
RNs with baccalaureates	142,730	280,640	479,230	236
RNs with advanced degrees	36,620	58,620	100,630	175
LPN enrollments	51,638	46,098	38,099	-26
Associate degree enrollments	51,396	75,028	76,547	49
Diploma enrollments	74,815	52,026	38,307	-49
Baccalaureate enrollments	79,551	120,158	133,382	68
Advanced degree enrollments	6,605	12,258	17,149	160
LPN admissions	61,668	55,968	46,500	-25
Associate degree admissions	36,972	48,408	50,088	35
Diploma admissions	29,796	18,720	15,264	-49
Baccalaureate (basic) admissions	27,372	33,876	34,956	28
Baccalaureate (RN) admissions	5,112	12,072	14,664	187
Advanced degree admissions	3,216	5,856	7,644	138
RNs in hospitals	487,740	702,800	994,810	104
RNs in ambulatory care	86,710	134,470	186,720	115
RNs in physicians' offices and group practices	54,361	82,794	119,454	120
RNs in OPDs and ERs	30,649	49,524	64,894	112
RNs in health centers	1,700	2,150	2,370	39
RNs in nursing homes	56,310	69,840	80,180	42
RNs in home care	17,400	20,360	30,780	77
RNs in nursing schools	29,900	34,210	35,120	17
RNs in public health	72,570	88,260	102,240	41
RNs in public health agencies (excluding home care)	23,370	30,430	38,970	67
RNs in occupational health	19,270	75,360	31,600	64
RNs in school health	29,930	32,470	31,670	06
RNs in private duty	44,630	38,400	29,260	-34
Nurse pers/pt (short-term hos.)	1,245	1,395	1,574	27
Nurse pers/pt (long-term hos.)	.454	.511	.577	27
Staff mix (hospitals) aides	.423	.342	.272	-36
LPNs	.193	.197	.196	02
RNs	.384	.462	.533	39
Short-term hospital census	811,000	941,000	1,051,000	30
Long-term hospital census	414,000	226,000	172,000	-58

Source: Western Interstate Commission for Higher Education, Analysis and Planning for Improved Distribution of Nursing Personnel and Services. A National Model of Supply, Demand and Distribution, Final Report. Boulder, 1977.

Table 3.—Projected requirements for full-time equivalent nursing personnel, by field of employment, 1982

Field of employment	Lower bound			Upper bound		
	RNs	LPNs	Aides	RNs	LPNs	Aides
Total	1,219,300	405,700	466,600	1,677,000	594,500	629,000
Hospitals	810,900	173,300	236,700	1,044,400	205,400	236,400
Nursing homes	118,000	210,700	220,500	243,300	370,200	380,000
Community health	99,800	6,200	9,400	150,900	7,500	12,600
School health	32,000	—	—	64,100	—	—
Occupational health	36,500	—	—	36,500	—	—
Physicians' offices	51,600	15,500	—	56,700	11,300	—
Nursing education	39,000	—	—	49,700	—	—
Private duty	22,500	—	—	20,200	—	—
Other	9,000	—	—	11,200	—	—

Source: Lum and Leonhard, Analysis and Planning for Improved Distribution of Nursing Personnel and Services, Panel of Expert Consultants' Final Report, Western Interstate Commission for Higher Education, 1977. In press.

Table 4.--Projections of national active supply of registered nurses, by educational preparation (Series I), 1977-1990

As of January 1	Total number of nurses					Full-time equivalencies				
	Total	AD & Dip.	Bacc.	Master's and above	Nurses per 100,000 pop. 1/	Total	AD & Dip.	Bacc.	Master's and above	Nurses per 100,000 pop. 1/
1977	1,011,000	797,400	175,800	37,800	467	854,000	664,800	153,900	35,400	395
1978	1,059,000	825,200	192,500	41,000	486	895,000	687,800	168,500	38,300	411
1979	1,106,000	852,300	209,300	44,100	503	935,000	710,200	183,200	41,300	426
1980	1,152,000	878,500	225,900	47,300	520	973,000	731,600	197,600	44,300	439
1981	1,195,000	901,400	243,500	50,600	534	1,010,000	749,900	212,700	47,300	451
1982	1,238,000	922,600	260,900	54,000	548	1,045,000	766,900	227,700	50,500	463
1983	1,276,000	941,000	277,800	57,500	560	1,077,000	781,500	242,200	53,800	472
1984	1,313,000	957,400	294,300	60,900	570	1,108,000	794,400	256,300	57,000	481
1985	1,345,000	971,000	310,100	64,400	579	1,135,000	804,800	269,700	60,200	488
1986	1,376,000	982,800	325,600	67,900	587	1,161,000	814,100	283,000	63,500	495
1987	1,405,000	992,900	341,100	71,600	593	1,185,000	822,200	296,200	67,000	501
1988	1,433,000	1,001,200	356,600	75,300	600	1,209,000	828,800	309,400	70,500	506
1989	1,459,000	1,007,700	372,000	79,100	605	1,230,000	833,700	322,500	74,100	510
1990	1,484,000	1,012,800	387,600	83,100	611	1,251,000	837,700	335,800	77,800	515

1/ Population projections were obtained from U.S. Department of Commerce, Bureau of the Census, Projections of the Population of the United States, 1977-2050, Series P-25, No. 704, July 1977. Series II projections as of July 1, adjusted for armed forces overseas, were used.

Source: Estimates prepared by Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Table 5.—Projections of national active supply of registered nurses, by educational preparation (Series II), 1977-1990

As of January 1	Total number of nurses: Total	AD & Dip.	Bacc.	Master's and above	Nurses per 100,000 pop. 1/	Full-time equivalencies: Total	AD & Dip.	Bacc.	Master's and above	Nurses per 100,000 pop. 1/
1977	1,011,000	797,400	175,800	37,800	467	854,000	664,800	153,900	35,400	395
1978	1,059,000	825,200	192,500	41,000	486	895,000	687,800	168,500	38,300	411
1979	1,106,000	852,300	209,300	44,100	503	935,000	710,100	183,200	41,300	426
1980	1,152,000	878,800	226,100	47,400	520	974,000	731,900	197,800	44,300	439
1981	1,199,000	903,400	244,500	50,700	536	1,013,000	751,600	213,600	47,400	453
1982	1,245,000	926,800	263,600	54,200	551	1,052,000	770,700	230,100	50,700	461
1983	1,290,000	948,900	283,500	57,900	566	1,090,000	788,700	247,300	54,100	478
1984	1,336,000	969,900	304,100	61,700	580	1,128,000	805,600	265,100	57,700	490
1985	1,380,000	989,200	325,400	65,600	594	1,166,000	821,100	283,400	61,400	502
1986	1,424,000	1,006,900	347,300	69,600	607	1,203,000	835,500	302,300	65,100	513
1987	1,466,000	1,022,900	369,600	73,800	619	1,239,000	848,500	321,600	69,100	523
1988	1,507,000	1,037,900	391,500	78,100	631	1,274,000	860,500	340,400	73,100	533
1989	1,548,000	1,050,200	414,700	82,600	642	1,308,000	870,600	360,400	77,300	543
1990	1,587,000	1,061,500	438,500	87,200	653	1,342,000	879,500	380,900	81,700	552

1/ Population projections were obtained from U.S. Department of Commerce, Bureau of the Census, Projections of the Population of the United States, 1977-2050, Series P-25, No. 704, July 1977. Series II projections as of July 1, adjusted for armed forces overseas, were used.

Source: Estimates prepared by Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Table 6.--Projections of national active supply of licensed practical nurses, 1977-1990

As of January 1	Series I Total number of nurses	FTEs	Total nurses per 100,000 pop.	FTEs per 100,000 pop. 1/	Series II Total number of nurses	FTEs	Total nurses per 100,000 pop.	FTEs per 100,000 pop. 1/
1977	498,000	437,000	230	202	498,000	437,000	230	202
1978	518,000	454,000	238	208	518,000	454,000	238	208
1979	538,000	471,000	245	214	537,000	470,000	244	214
1980	557,000	487,000	251	220	556,000	486,000	251	219
1981	575,000	503,000	257	225	573,000	501,000	256	224
1982	592,000	518,000	262	229	589,000	516,000	261	228
1983	610,000	534,000	268	234	605,000	530,000	265	232
1984	627,000	549,000	272	239	620,000	543,000	269	236
1985	644,000	564,000	277	243	634,000	556,000	273	239
1986	660,000	578,000	281	246	648,000	568,000	276	242
1987	676,000	593,000	286	251	661,000	580,000	279	245
1988	691,000	606,000	289	254	673,000	591,000	282	247
1989	706,000	619,000	293	257	684,000	601,000	284	249
1990	719,000	632,000	296	260	694,000	609,000	286	251

1/ Population projections were obtained from U.S. Department of Commerce, Bureau of the Census, Projections of the Population of the United States, 1977-2050, Series P-25, No. 704, July 1977. Series II projections as of July 1, adjusted for armed forces overseas, were used.

Source: Estimates prepared by Division of Nursing, Health Resources Administration. U.S. Department of Health, Education, and Welfare, 1977.

Table 7.—Full-time equivalent personnel in hospitals in the United States, by selected type of personnel and type of hospital, 1973-1976

Year and type of personnel	Total		Type of hospital					
			General		Psychiatric		Other	
	Number	Percent change over prior year	Number	Percent change over prior year	Number	Percent change over prior year	Number	Percent change over prior year
1973								
Total personnel	2,768,607	+3.7	2,330,350	+4.5	332,636	-1.9	105,621	+4.8
Registered nurses	446,387	+4.9	413,037	+5.1	20,923	- .9	12,427	+6.3
Licensed practical nurses	222,599	+3.2	198,742	+3.8	16,084	-5.6	7,773	+7.2
1974								
Total personnel	2,918,736	+5.4	2,475,181	+6.2	338,187	+1.7	105,368	- .2
Registered nurses	478,577	+7.2	443,617	+7.4	22,651	+8.3	12,309	- .9
Licensed practical nurses	233,534	+4.9	209,708	+5.5	16,207	+ .8	7,619	-2.0
1975								
Total personnel	3,022,597	+3.6	2,593,708	+4.8	323,917	-4.2	104,972	- .4
Registered nurses	510,118	+6.6	474,876	+7.0	22,632	- .1	12,610	+2.4
Licensed practical nurses	239,949	+2.7	217,822	+3.9	14,800	-8.7	7,327	-3.8
1976								
Total personnel	3,107,614	+2.8	2,691,683	+3.8	315,336	-2.6	100,595	-4.2
Registered nurses	538,141	+5.5	502,786	+5.9	22,956	+1.4	12,399	-1.7
Licensed practical nurses	243,586	+1.5	221,080	+1.5	15,756	+6.5	6,750	-7.9

Source: American Hospital Association. Hospital Statistics, Data from the American Hospital Association Annual Survey, Annual editions, 1972-1977.

Table 8.--Projected number of practical nursing graduates, academic years 1971-1972 through 1988-1989

Academic year	Series I	Series II
1971-72[1]	43,673	43,673
1972-73[1]	45,565	45,565
1973-74[1]	45,002	45,002
1974-75[1]	45,375	45,375
1975-76[1]	47,145	47,145
1976-77	47,100	47,100
1977-78	47,100	46,700
1978-79	47,500	46,700
1979-80	47,800	46,500
1980-81	48,100	46,400
1981-82	48,400	46,200
1982-83	48,800	46,200
1983-84	49,200	46,100
1984-85	49,500	45,900
1985-86	49,800	45,700
1986-87	50,100	45,500
1987-88	50,500	45,400
1988-89	50,900	45,300

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[1] Actual data reported by the National League for Nursing for graduates of United States schools only.

Sources: National League for Nursing, State-Approved Schools for Nursing-LPN, Annual editions, 1973-1976.

Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Table 9.—Projected number of graduates from basic nursing programs preparing registered nurses, by type of program, (Series I), academic years 1971-1972 through 1988-1989

Academic year	Series I				Series IA			
	Total	AD	Dip.	Bacc.	Total	AD	Dip.	Bacc.
1971-72[1]	51,304	18,926	21,410	10,968	51,304	18,926	21,410	10,968
1972-73[1]	58,881	24,497	21,329	13,055	58,881	24,497	21,329	13,055
1973-74[1]	67,061	28,919	21,185	16,957	67,061	28,919	21,185	16,957
1974-75[1]	73,915	32,183	21,562	20,170	73,915	32,183	21,562	20,170
1975-76[1]	77,065	34,625	19,861	22,579	77,065	34,625	19,861	22,579
1976-77	81,900	36,600	18,300	27,000	81,900	36,600	18,300	27,000
1977-78	83,400	37,700	17,500	28,200	82,400	36,700	17,500	28,200
1978-79	83,700	39,300	16,200	28,200	81,800	37,400	16,200	28,200
1979-80	82,500	38,500	14,800	29,200	80,500	35,700	14,800	30,000
1980-81	81,700	38,200	13,300	30,200	80,000	34,600	13,300	32,100
1981-82	79,200	37,300	11,600	30,300	77,500	32,900	11,600	33,000
1982-83	77,000	36,900	10,100	30,000	75,300	31,600	10,100	33,600
1983-84	74,300	36,100	8,400	29,800	72,600	30,000	8,400	34,200
1984-85	72,300	35,700	6,700	29,900	70,700	28,900	6,700	35,100
1985-86	70,900	35,800	5,100	30,000	69,000	27,900	5,100	36,000
1986-87	69,300	35,500	3,300	30,500	67,500	26,900	3,300	37,300
1987-88	68,100	35,500	1,600	31,000	67,300	26,900	1,600	38,800
1988-89	66,700	35,200	--	31,500	66,700	26,800	--	39,900

[1] Actual data reported by the National League for Nursing for graduates of United States schools only.

Sources: National League for Nursing, State-Approved Schools of Nursing--RN. Annual editions, 1973-1977.

Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Table 10.--Projected number of graduates from basic nursing programs preparing registered nurses, by type of program, (Series II), academic years 1971-1972 through 1988-1989

Academic year	Series II				Series IIA			
	Total	AD	Dip.	Bacc.	Total	AD	Dip.	Bacc.
1971-72 1/	51,304	18,926	21,410	10,968	51,304	18,926	21,410	10,968
1972-73 1/	58,881	24,497	21,329	13,055	58,881	24,497	21,329	13,055
1973-74 1/	67,061	28,919	21,185	16,957	67,061	28,919	21,185	16,957
1974-75 1/	73,915	32,183	21,562	20,170	73,915	32,183	21,562	20,170
1975-76 1/	77,065	34,625	19,861	22,579	77,065	34,625	19,861	22,579
1976-77	81,900	36,600	18,300	27,000	81,900	36,600	18,300	27,000
1977-78	83,300	37,600	17,500	28,200	82,400	36,700	17,500	28,200
1978-79	83,700	39,300	16,200	28,200	81,800	37,400	16,200	28,200
1979-80	85,200	40,800	14,800	29,600	83,100	37,900	14,800	30,400
1980-81	86,400	41,700	13,300	31,400	84,300	37,700	13,300	33,300
1981-82	87,400	42,900	11,600	32,900	85,100	37,700	11,600	35,800
1982-83	88,500	43,700	10,100	34,700	86,100	37,300	10,100	38,700
1983-84	89,100	44,300	8,400	36,400	86,800	36,900	8,400	41,500
1984-85	89,300	44,800	6,700	37,800	86,900	36,200	6,700	44,000
1985-86	89,200	44,900	5,100	39,200	86,700	35,000	5,100	46,600
1986-87	89,400	45,500	3,300	40,600	87,000	34,600	3,300	49,100
1987-88	89,100	45,500	1,600	42,000	87,900	34,600	1,600	51,700
1988-89	89,300	46,100	--	43,200	89,000	35,000	--	54,000

1/ Actual data reported by the National League for Nursing for graduates of United States schools only.

Sources: National League for Nursing, State-Approved Schools of Nursing--RN. Annual editions, 1973-1977. Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Table 11.--Nurses admitted to the United States, by immigration status, fiscal years 1972-1976

Immigration status	1972	1973	1974	1975	1976
Total nurses admitted	8,740	9,468	7,910	8,460	8,062
Immigrant nurses					
Total	6,851	6,335	5,331	6,131	6,421
Beneficiaries of occupational preference					
Third preference admissions	961	823	1,688	1,980	2,004
Adjustments	527	433	355	451	715
Sixth preference admissions	167	40	32	59	11
Adjustments	202	78	62	66	33
Total	1,857	1,374	2,137	2,556	2,763
All others	[2]4,994	[2]4,961	3,194	3,575	3,658
Nonimmigrant nurses[1]					
Total	1,889	3,133	2,579	2,338	1,642
Distinguished merit and ability	1,486	2,673	2,096	2,084	1,409
Exchange visitors	382	424	313	213	192
Trainees[2]	4	12	54	25	6
Other temporary	17	22	62	6	33
Transferees	--	2	54	10	2

[1] Includes visa categories H, J and L.

[2] Includes students of professional nursing.

Source: Annual reports of Immigration and Naturalization Service, Department of Justice.

Table 12.—Professional nurses admitted as immigrants,[1/] by region and country of last permanent residence, fiscal year, 1972-1976

	1972	1973	1974	1975	1976
All Countries	6,789	6,283	5,331	6,131	6,421
Europe	1,145	1,262	834	916	965
Germany	105	126	111	123	128
Ireland	168	203	95	64	50
United Kingdom	552	584	394	480	456
Other	320	349	234	249	331
Asia	3,811	3,578	3,457	4,183	4,460
Taiwan	171	182	125	139	72
India	536	594	827	1,289	1,236
Korea	736	743	988	866	821
Philippines	1,580	1,273	997	1,245	1,748
Thailand	438	394	235	295	230
Other	350	392	285	349	353
Africa	230	188	124	145	155
Oceania	99	112	73	76	82
North and Central America	1,323	958	715	695	607
Canada	773	529	333	309	293
Jamaica	186	114	105	88	87
Trinidad and Tobago	87	--	--	--	50
Other	277	315	277	298	177
South America	181	185	128	116	92
Guyana	74	--	--	--	38
Other	107	--	--	--	54

[1/] Permanent resident aliens.

Source: Annual reports of Immigration and Naturalization Service, Department of Justice.

Table 13.--Professional nurses entering United States as nonimmigrant aliens[1] by visa category and by region and country of last permanent residence, fiscal year 1972-1976

	1972			1973			1974			1975			1976		
	H[2]	J[3]	H&J	H[2]	J[3]	H&J	H[2]	J[3]	H&J	H[2]	J[3]	H&J	H[2]	J[3]	H&J
All Countries	1,507	382	1,889	2,707	424	3,131	2,212	313	2,525	2,112	226	2,338	1,448	194	1,642
Europe	318	44	362	373	36	409	188	35	223	243	29	272	252	21	273
Ireland	102	5	107	105	--	105	54	4	58	62	2	64	70	--	70
United Kingdom	198	5	203	248	9	257	114	9	123	171	9	180	166	10	176
Other	18	34	52	20	27	47	20	22	42	10	18	28	16	11	27
Asia	843	285	1,128	1,909	302	2,211	1,643	154	1,797	1,650	67	1,717	987	53	1,040
India	10	14	24	--	--	—	--	—	--	—	—	—	--	10	10
Japan	25	7	32	--	--	--	--	--	--	—	--	—	--	9	9
Korea	58	6	64	44	4	48	36	4	40	--	--	--	--	1	1
Philippines	728	240	968	1,824	252	2,076	1,580	119	1,699	1,633	36	1,669	976	17	993
Other	22	18	40	41	46	87	27	31	58	17	31	48	11	16	27
Africa	1	5	6	11	18	29	10	36	46	7	30	37	9	59	68
Oceania	24	4	28	82	6	88	51	3	54	11	4	16	6	2	8
Australia	23	4	27	71	5	76	48	2	50	9	3	12	5	2	7
Other	1	--	1	11	1	12	3	1	4	2	1	4	1	--	1
North and Central America	318	28	346	324	35	359	311	31	342	193	27	220	184	35	219
Canada	281	7	288	248	1	249	233	6	239	107	3	110	131	1	132
Jamaica	10	5	15	22	3	25	10	1	11	18	2	20	15	--	15
Mexico	--	--	--	--	--	--	1	--	1	23	7	30	4	1	5
Other	27	16	43	54	31	85	67	24	91	45	15	60	34	33	67
South America	3	16	19	8	27	35	9	54	63	8	69	77	10	24	34
Bolivia	--	--	--	--	1	1	--	7	7	--	28	28	—	11	11
Other	--	--	--	8	26	34	9	47	56	8	41	49	10	13	23

1/ Temporary resident aliens.
2/ "H" visas are assigned to persons entering the United States for purposes of employment.
3/ "J" visas are assigned to persons entering the United States on student status as exchange visitors.
Source: Annual reports of Immigration and Naturalization Service, Department of Justice.

Table 14.--Employment status of registered nurses in each State and region, 1972

	Total		Employed in nursing										Not employed in nursing		Employment status not reported	
			Total employed		Full time		Regular part time		Irregular part time		Full or part time not reported					
State and region	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
United States	1,127,657	100.0	778,470	69.0	505,201	44.8	159,609	14.1	78,591	7.0	35,069	3.1	316,611	28.1	32,576	2.9
New England	105,822	100.0	69,869	66.0	37,957	35.9	21,964	20.7	6,741	6.4	3,207	3.0	30,319	28.7	5,634	5.3
Connecticut	23,612	100.0	17,567	74.4	8,439	35.7	6,116	25.9	1,414	6.0	1,598	6.8	5,530	23.4	515	2.2
Maine	7,440	100.0	4,700	63.2	2,630	35.4	1,367	18.4	479	6.4	224	3.0	2,493	33.5	247	3.3
Massachusetts	56,567	100.0	35,755	63.2	20,009	35.4	11,459	20.2	3,437	6.1	850	1.5	16,333	28.9	4,479	7.9
New Hampshire	7,044	100.0	4,388	62.3	2,554	36.3	835	11.8	699	9.9	300	4.3	2,469	35.0	187	2.7
Rhode Island	6,638	100.0	4,631	69.8	2,602	39.2	1,466	22.1	427	6.4	136	2.1	1,867	28.1	140	2.1
Vermont	4,521	100.0	2,828	62.5	1,723	38.1	721	15.9	285	6.3	99	2.2	1,627	36.0	66	1.5
Middle Atlantic	273,269	100.0	178,910	65.5	109,441	40.1	43,289	15.8	18,525	6.8	7,655	2.8	86,713	31.7	7,646	2.8
New Jersey	51,061	100.0	30,973	60.6	18,018	31.3	8,617	16.9	3,617	7.1	2,721	5.3	17,902	35.1	2,186	4.3
New York	125,794	100.0	89,072	70.8	57,722	45.9	20,750	16.5	8,403	6.7	2,197	1.7	36,023	28.6	699	0.6
Pennsylvania	96,414	100.0	58,865	61.1	35,701	37.0	13,922	14.5	6,505	6.8	2,737	2.8	32,788	34.0	4,761	4.9
South Atlantic	151,019	100.0	107,116	70.9	72,537	48.0	15,9 5	10.6	11,898	7.9	6,696	4.4	39,900	26.4	4,003	2.7
Delaware	4,389	100.0	2,886	65.8	1,672	38.1	609	13.9	328	7.5	277	6.3	1,424	32.4	79	1.8
Dist. of Columbia	5,545	100.0	4,968	89.6	3,641	65.7	633	11.4	445	8.0	249	4.5	519	9.4	58	1.0
Florida	38,398	100.0	25,498	66.4	17,847	46.5	2,950	7.7	3,400	8.8	1,301	3.4	11,058	28.8	1,842	4.8
Georgia	17,423	100.0	12,353	70.9	9.364	53.8	1,530	8.8	1,033	5.9	426	2.4	4,836	27.8	234	1.3
Maryland	22,462	100.0	14,596	65.0	9,172	40.8	3,461	15.4	1,633	7.3	330	1.5	7,152	31.8	714	3.2
North Carolina	21,366	100.0	16,573	77.6	10,974	51.4	1,995	9.3	1,639	7.7	1,965	9.2	4,660	21.8	133	0.6
South Carolina	10,187	100.0	7,790	76.5	5,555	54.5	973	9.6	792	7.8	470	4.6	2,141	21.0	256	2.5
Virginia	23,935	100.0	16,472	68.8	10,179	42.5	2,935	12.3	2,045	8.5	1,313	5.5	7,140	29.8	323	1.4
West Virginia	7,314	100.0	5,980	81.7	4,133	56.5	899	12.3	583	7.9	365	5.0	970	13.3	364	5.0
East South Central	40,308	100.0	30,624	76.0	21,968	54.5	3,592	8.9	2,805	7.0	2,259	5.6	9,216	22.9	468	1.1
Alabama	10,235	100.0	7,753	75.7	5,410	52.9	914	8.9	674	5.6	855	8.3	2,361	23.1	121	1.2
Kentucky	11,734	100.0	8,432	71.9	5,673	48.3	1,427	12.2	747	6.4	585	5.0	3,157	26.9	145	1.2
Mississippi	6,288	100.0	5,101	81.1	4,211	67.0	85	1.3	747	11.9	58	0.9	1,140	18.1	47	0.8
Tennessee	12,051	100.0	9,338	77.5	6,674	55.4	1,166	9.7	737	6.1	761	6.3	2,558	21.2	155	1.3
West South Central	65,627	100.0	47,233	72.0	33,837	51.6	6,128	9.3	3,612	5.5	3,656	5.6	17,722	27.0	672	1.0
Arkansas	5,033	100.0	3,757	74.6	2,637	52.4	528	10.5	289	5.7	303	6.0	1,216	24.2	60	1.2
Louisiana	11,524	100.0	9,070	78.7	6,200	53.8	1,148	10.0	806	7.0	916	7.9	2,351	20.4	103	0.9
Oklahoma	8,698	100.0	6,496	74.7	4,858	55.8	928	10.7	492	5.7	218	2.5	2,161	24.8	41	0.5
Texas	40,372	100.0	27,910	69.1	20,142	49.9	3,524	8.7	2,025	5.0	2,219	5.5	11,994	29.7	468	1.2
East North Central	209,338	100.0	148,842	71.1	102,440	48.9	30,489	14.6	12,894	6.2	3,019	1.4	53,483	25.5	7,013	3.4
Illinois	60,806	100.0	44,223	72.7	28,446	46.8	10,304	16.9	4,669	7.7	804	1.3	15,726	25.9	857	1.4
Indiana	21,481	100.0	15,539	72.3	9,759	45.4	3,672	17.1	1,800	8.4	308	1.4	4,955	23.1	987	4.6
Michigan	46,681	100.0	29,923	64.1	17,686	37.9	8,285	17.8	2,769	5.9	1,183	2.5	13,998	30.0	2,760	5.9
Ohio	57,052	100.0	40,308	70.7	36,609	64.2	1,417	2.5	1,962	3.4	320	0.6	14,396	25.2	2,348	4.1
Wisconsin	23,318	100.0	18,849	80.8	9,940	42.6	6,811	29.2	1,694	7.3	404	1.7	4,408	18.9	61	0.3

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Table 14.--Employment status of registered nurses in each State and region, 1972--Continued

State and region	Total		Employed in nursing										Not employed in nursing		Employment status not reported	
			Total employed		Full time		Regular part time		Irregular part time		Full or part time not reported					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
West NorthCentral	90,231	100.0	66,356	73.5	38,997	43.2	16,383	18.1	7,553	8.4	3,423	3.8	21,278	23.6	2,597	2.9
Iowa	17,812	100.0	11,925	67.0	7,034	39.5	3,234	18.2	1,461	8.2	196	1.1	5,810	32.6	77	0.4
Kansas	12,655	100.0	8,961	70.8	5,738	45.3	1,861	14.7	803	6.4	559	4.4	3,511	27.7	183	1.5
Minnesota	21,638	100.0	18,222	77.1	9,966	42.2	5,307	22.4	2,453	10.4	496	2.1	3,864	16.3	1,552	6.6
Missouri	18,823	100.0	14,721	78.2	9,193	48.8	2,957	15.7	1,383	7.4	1,188	6.3	3,778	20.1	324	1.7
Nebraska	9,798	100.0	6,649	67.9	3,806	38.9	1,621	16.5	702	7.2	520	5.3	2,914	29.7	235	2.4
North Dakota	3,653	100.0	2,853	78.1	1,698	46.5	617	16.9	407	11.1	131	3.6	738	20.2	62	1.7
South Dakota	3,852	100.0	3,025	78.5	1,562	40.6	786	20.4	344	8.9	333	8.6	663	17.2	164	4.3
Mountain	49,176	100.0	33,950	69.0	24,483	49.8	4,911	10.0	3,629	7.3	927	1.9	13,101	26.7	2,125	4.3
Arizona	12,383	100.0	7,418	59.9	6,855	55.4	277	2.2	177	1.4	109	0.9	3,405	27.5	1,560	12.6
Colorado	15,515	100.0	11,634	75.0	7,869	50.7	1,907	12.3	1,430	9.2	428	2.8	3,567	23.0	314	2.0
Idaho	3,755	100.0	2,504	66.7	1,582	42.1	516	13.8	375	10.0	31	0.8	1,216	32.4	35	0.9
Montana	4,429	100.0	3,246	73.3	1,836	41.4	836	18.9	443	10.0	131	3.0	1,150	26.0	33	0.7
Nevada	2,564	100.0	1,718	67.0	1,331	51.9	220	8.6	137	5.3	30	1.2	816	31.8	30	1.2
New Mexico	4,077	100.0	2,755	67.6	2,005	49.2	96	2.3	565	13.9	89	2.2	1,277	31.3	45	1.1
Utah	4,531	100.0	3,205	70.7	2,061	45.5	692	15.3	363	8.0	89	1.9	1,232	27.2	94	2.1
Wyoming	1,922	100.0	1,470	76.5	944	49.1	367	19.1	139	7.2	20	1.1	438	22.8	14	0.7
Pacific	142,867	100.0	95,570	66.9	63,541	44.5	16,868	11.8	10,934	7.6	4,227	3.0	44,879	31.4	2,418	1.7
Alaska	2,030	100.0	1,373	67.6	943	46.5	183	9.0	179	8.8	68	3.3	617	30.4	40	2.0
California	103,385	100.0	68,118	65.9	45,950	44.4	11,513	11.1	7,390	7.2	3,265	3.2	33,733	32.6	1,534	1.5
Hawaii	4,117	100.0	3,074	74.7	2,437	59.2	229	5.6	229	5.6	179	4.3	988	24.0	55	1.3
Oregon	11,382	100.0	8,739	76.8	5,388	47.4	1,890	16.6	1,313	11.5	148	1.3	2,558	22.5	85	0.7
Washington	21,953	100.0	14,266	65.0	8,823	40.2	3,053	13.9	1,823	8.3	567	2.6	6,983	31.8	704	3.2

Source: Roth, Aleda V., and Walden, Alice R. The Nation's Nurses: 1972 Inventory of Registered Nurses. Kansas City, American Nurses' Association, 1974.

Table 15.--Employment status of licensed practical nurses in each State and region, 1974

State and region	Total		Employed in nursing										Not employed in nursing		Employment status not reported	
			Total employed		Full time		Regular part time		Irregular part time		Full or part time not reported					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
United States	533,459	100.0	377,889	70.9	276,947	51.9	46,158	8.7	42,775	8.0	12,009	2.3	113,689	21.3	41,881	7.8
New England	36,320	100.0	25,284	69.6	16,397	45.1	5,867	16.2	2,681	7.4	339	.9	8,663	23.9	2,373	6.5
Connecticut	7,198	100.0	5,610	78.0	3,633	50.5	1,763	24.5	200	2.8	14	.2	1,263	17.5	325	4.5
Maine	2,589	100.0	1,865	72.1	1,189	45.9	342	13.3	321	12.4	13	.5	669	25.8	55	2.1
Massachusetts	19,387	100.0	12,799	66.0	8,398	43.3	2,672	13.8	1,530	7.9	199	1.0	4,753	24.5	1,835	9.5
New Hampshire	2,211	100.0	1,500	67.8	968	43.8	245	11.1	251	11.3	36	1.6	640	29.0	71	3.2
Rhode Island	2,990	100.0	2,239	74.9	1,359	45.5	601	20.1	228	7.6	51	1.7	694	23.2	57	1.9
Vermont	1,945	100.0	1,271	65.4	850	43.7	244	12.6	151	7.8	26	1.3	644	33.1	30	1.5
Middle Atlantic	102,165	100.0	66,139	64.7	48,136	47.1	10,030	9.8	7,399	7.2	574	.6	26,975	26.4	9,051	8.9
New Jersey	20,789	100.0	9,104	43.8	6,448	31.0	1,596	7.8	1,025	4.9	35	.1	3,725	17.9	7,960	38.3
New York	45,798	100.0	32,817	71.6	23,386	51.0	5,103	11.1	3,926	8.6	402	.9	12,436	27.2	545	1.2
Pennsylvania	35,578	100.0	24,218	68.1	18,302	51.4	3,331	9.4	2,448	6.9	137	.4	10,814	30.4	546	1.5
South Atlantic	73,733	100.0	54,059	73.3	36,219	49.1	3,431	4.6	5,664	7.7	8,747	11.9	14,430	19.6	5,244	7.1
Delaware	1,165	100.0	823	70.7	605	52.0	96	8.2	120	10.3	2	.2	309	26.5	33	2.8
Dist. of Columbia	2,655	100.0	2,297	86.5	1,919	72.3	107	4.0	230	8.7	41	1.5	297	11.2	61	2.3
Florida	17,130	100.0	12,313	71.9	9,225	53.8	889	5.2	2,018	11.8	181	1.1	4,229	24.7	588	3.4
Georgia	13,721	100.0	7,822	57.0	6,610	48.2	467	3.4	696	5.0	49	.4	2,036	14.8	3,863	28.2
Maryland	6,814	100.0	5,098	74.8	3,976	58.3	592	8.7	496	7.3	34	.5	1,514	22.2	202	3.0
North Carolina	11,114	100.0	8,851	79.6	461	4.2	58	.5	116	1.0	8,218	73.9	2,167	19.5	96	.9
South Carolina	5,476	100.0	4,496	82.1	3,610	65.9	343	6.3	415	7.6	128	2.3	803	14.7	177	3.2
Virginia	11,260	100.0	8,928	79.3	7,031	62.4	696	6.2	1,154	10.3	47	.4	2,224	19.7	108	1.0
West Virginia	4,398	100.0	3,431	78.0	2,782	63.2	183	4.2	419	9.5	47	1.1	851	19.4	116	2.6
East South Central	36,704	100.0	27,617	75.2	22,687	61.8	1,809	4.9	2,328	6.3	793	2.2	5,802	15.8	3,285	9.0
Alabama	10,056	100.0	8,217	81.7	6,848	68.1	483	4.8	508	5.0	378	3.8	1,620	16.1	219	2.2
Kentucky	6,624	100.0	5,146	77.7	4,136	62.5	250	3.7	564	8.5	196	3.0	1,365	20.6	113	1.7
Mississippi	5,641	100.0	4,702	83.4	3,796	67.3	360	6.4	433	7.7	113	2.0	89[illegible]	15.8	47	.8
Tennessee	14,383	100.0	9,552	66.4	7,907	55.0	716	5.0	823	5.7	106	.7	1,92[illegible]	13.4	2,906	20.2
West South Central	65,939	100.0	49,434	75.0	40,809	62.0	2,113	3.2	6,411	9.7	101	.1	14,116	21.4	2,389	3.6
Arkansas	6,530	100.0	4,959	76.0	4,023	61.6	362	5.6	551	8.4	23	.4	1,492	22.8	79	1.2
Louisiana	9,416	100.0	7,460	79.2	5,635	59.8	453	4.8	1,326	14.1	46	.5	1,778	18.9	178	1.9
Oklahoma	7,080	100.0	5,462	77.2	4,591	64.8	586	8.3	280	4.0	5	.1	1,560	22.0	58	.8
Texas	42,913	100.0	31,553	73.5	26,560	42.9	712	1.6	4,254	9.9	27	.1	9,286	21.7	2,074	4.8

Table 15.--Employment status of licensed practical nurses in each State and region, 1974--Continued

State and region	Total		Employed in nursing										Not employed in nursing		Employment status not reported	
			Total employed		Full time		Regular part time		Irregular part time		Full or part time not reported					
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
East North Central	91,312	100.0	70,371	77.0	50,149	54.9	12,133	13.3	7,685	8.4	404	.4	17,957	19.7	2,984	3.3
Illinois	18,564	100.0	15,173	81.7	11,259	60.6	1,439	7.8	2,264	12.2	211	1.1	3,082	16.6	309	1.7
Indiana	8.051	100.0	6,200	77.0	4,515	56.1	542	6.8	1,117	13.8	26	.3	1,372	7.1	479	5.9
Michigan	25,419	100.0	17,479	68.8	12,170	47.9	3,180	12.5	2,119	8.3	10	.1	6,528	25.7	1,412	5.5
Ohio	29,956	100.0	23,585	78.7	17,238	57.5	5,059	16.9	1,138	3.8	150	.5	5,624	18.8	747	2.5
Wisconsin	9,322	100.0	7,934	85.1	4,967	53.3	1,913	20.5	1,047	11.2	7	.1	1,351	14.5	37	.4
West North Central	40,600	100.0	32,154	79.2	22,349	55.1	5,253	12.9	3,879	9.5	673	1.7	7,069	17.4	1,377	3.4
Iowa	7,100	100.0	5,571	78.5	3,836	54.0	1,184	16.7	527	7.4	24	.4	1,485	20.9	44	.6
Kansas	4,170	100.0	3,140	75.3	2,469	59.2	254	6.1	292	7.0	125	3.0	888	21.3	142	3.4
Minnesota	11,477	100.0	9,092	79.2	5,504	48.0	2,027	17.6	1,503	13.1	58	.5	1,820	15.9	565	4.9
Missouri	10,809	100.0	8,973	83.0	6,629	61.3	951	8.8	960	8.9	433	4.0	1,324	12.3	512	4.7
Nebraska	3,800	100.0	2,805	73.8	2,085	54.9	480	12.6	220	5.8	20	.5	904	23.8	91	2.4
North Dakota	1,741	100.0	1,392	80.0	974	55.9	167	9.6	243	14.0	8	.5	336	19.3	13	.7
South Dakota	1,503	100.0	1,181	78.6	852	56.7	190	12.7	134	8.9	5	.3	312	20.8	10	.6
Mountain	22,165	100.0	15,773	71.1	11,846	53.4	1,581	7.1	2,234	10.1	112	.5	5,437	24.5	955	4.3
Arizona	4,323	100.0	3,097	71.6	2,352	54.4	234	5.4	474	10.9	37	.9	963	22.3	263	6.1
Colorado	5,876	100.0	4,448	75.7	3,262	55.5	486	8.3	660	11.2	40	.7	1,298	22.1	130	2.2
Idaho	2,812	100.0	1,982	70.5	1,470	52.3	246	8.7	264	9.4	2	.1	808	28.7	22	.8
Montana	1,907	100.0	1,412	74.0	1,097	57.5	184	9.6	126	6.6	5	.3	474	24.9	21	1.1
Nevada	1,397	100.0	976	69.9	807	57.8	90	6.4	72	5.2	7	.5	372	26.6	49	3.5
New Mexico	2,519	100.0	1,736	68.9	1,365	54.2	21	.8	347	13.8	3	.1	691	27.4	92	3.7
Utah	2,683	100.0	1,636	61.0	1,128	42.1	261	9.7	230	8.6	17	.6	676	25.2	371	13.8
Wyoming	648	100.0	486	75.0	365	56.3	59	9.1	61	9.4	1	.2	155	23.9	7	1.1
Pacific	64,521	100.0	37,058	57.5	28,355	44.0	3,941	6.1	4,494	7.0	268	.4	13,240	20.5	14,223	22.0
Alaska	624	100.0	391	62.7	301	48.3	25	4.0	63	10.1	2	.3	213	34.1	20	3.2
California	47,725	100.0	25,976	54.4	20,052	42.0	2,966	6.2	2,782	5.8	176	.4	8,335	17.6	13,414	28.1
Hawaii	2,189	100.0	1,365	62.3	1,228	56.1	60	2.7	63	2.9	14	.6	382	17.5	442	20.2
Oregon	4,174	100.0	3,041	72.9	2,209	52.9	42	1.0	770	18.5	20	.5	1,033	24.7	100	2.4
Washington	9,809	100.0	6,285	64.1	4,565	46.5	848	8.7	816	8.3	56	.6	3,277	33.4	247	2.5

Source: Roth, Aleda V. and Schmittling, Gordon T. LPNs: 1974 Inventory of Licensed Practical Nurses. Kansas City, American Nurses' Association, 1977.

Table 16.--Field of employment of employed registered nurses in each State and region, 1972

State and region	Total number	Hospital		Nursing home		School of nursing		Private duty		Public health		School nurse		Industrial		Office nurse [physician's or dentist's]		Other specified field		Not reported	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
United States, number	778,470	499,594	...	53,988	...	28,820	...	38,923	...	39,096	...	29,849	...	19,403	...	52,390	...	4,086	...	12,321	...
percent	100.0	...	64.2	...	7.0	...	3.7	...	5.0	...	5.0	...	3.8	...	2.5	...	6.7	...	0.5	...	1.6
New England	69,869	42,111	60.3	7,941	11.4	2,580	3.7	5,056	7.2	3,400	4.9	2,989	4.3	1,386	2.0	2,945	4.2	450	0.6	1,011	1.4
Connecticut	17,567	9,031	51.4	2,677	15.3	491	2.8	1,910	10.9	769	4.4	932	5.3	463	2.6	901	5.1	247	1.4	146	0.8
Maine	4,700	3,023	64.3	354	7.5	145	3.1	325	6.9	266	5.7	150	3.2	106	2.3	257	5.5	21	0.4	53	1.1
Massachusetts	35,755	22,718	63.5	3,704	10.4	1,512	4.2	2,192	6.1	1,737	4.9	1,311	3.7	620	1.7	1,220	3.4	111	0.3	630	1.8
New Hampshire	4,388	2,510	57.2	531	12.1	169	3.9	251	5.7	221	5.1	251	5.7	70	1.6	278	6.3	41	0.9	66	1.5
Rhode Island	4,631	3,206	69.2	322	6.9	163	3.5	245	5.3	217	4.7	175	3.8	87	1.9	124	2.7	19	0.4	73	1.6
Vermont	2,828	1,623	57.4	353	12.5	100	3.6	133	4.7	190	6.7	170	6.0	40	1.4	165	5.8	11	0.4	43	1.5
Middle Atlantic	178,910	109,174	61.0	12,612	7.0	6,942	3.9	13,902	7.8	8,399	4.7	10,162	5.7	4,689	2.6	9,412	5.3	581	0.3	3,037	1.7
New Jersey	30,973	16,838	54.4	2,470	8.0	974	3.1	2,068	6.7	1,468	4.7	2,527	8.2	903	2.9	2,108	6.8	91	0.3	1,526	4.9
New York	89,072	56,054	62.9	5,674	6.4	3,620	4.1	7,564	8.5	4,666	5.2	4,562	5.1	2,132	2.4	3,624	4.1	289	0.3	887	1.0
Pennsylvania	58,865	36,282	61.6	4,468	7.6	2,348	4.0	4,270	7.3	2,265	3.8	3,073	5.2	1,654	2.8	3,680	6.3	201	0.3	624	1.1
South Atlantic	107,116	68,103	63.6	5,303	4.9	3,887	3.6	7,186	6.7	7,312	6.8	2,638	2.5	2,736	2.6	7,601	7.1	675	0.6	1,675	1.6
Delaware	2,886	1,567	54.3	217	7.5	149	5.2	172	6.0	152	5.3	220	7.6	105	3.6	257	8.9	13	0.4	34	1.2
Dist. of Columbia	4,968	3,197	64.3	79	1.6	207	4.2	441	8.9	388	7.8	95	1.9	238	4.8	167	3.4	44	0.9	112	2.2
Florida	25,498	16,358	64.1	1,696	6.6	587	2.3	2,283	8.9	1,417	5.6	199	0.8	477	1.9	1,937	7.6	91	0.4	453	1.8
Georgia	12,353	7,814	63.2	589	4.8	484	3.9	738	6.0	974	7.9	191	1.5	338	2.7	811	6.6	256	2.1	158	1.3
Maryland	14,596	9,149	62.7	857	5.9	622	4.3	766	5.2	1,256	8.6	498	3.4	344	2.3	831	5.7	59	0.4	214	1.5
North Carolina	16,573	10,540	63.6	580	3.5	695	4.2	958	5.8	1,051	6.3	581	3.5	397	2.4	1,358	8.2	98	0.6	315	1.9
South Carolina	7,790	4,621	59.3	423	5.4	269	3.4	516	6.6	573	7.4	249	3.2	263	3.4	722	9.3	39	0.5	115	1.5
Virginia	16,472	10,606	64.4	692	4.2	638	3.9	1,030	6.3	1,192	7.2	482	2.9	381	2.3	1,195	7.3	57	0.3	199	1.2
West Virginia	5,980	4,251	71.1	170	2.8	236	3.9	282	4.7	309	5.2	123	2.1	193	3.2	323	5.4	18	0.3	75	1.3
East South Central	30,624	20,996	68.5	1,237	4.0	1,367	4.5	1,154	3.8	2,078	6.8	559	1.8	907	3.0	1,578	5.1	299	1.0	449	1.5
Alabama	7,753	5,397	69.6	312	4.0	352	4.5	223	2.9	450	5.8	132	1.7	239	3.1	400	5.2	58	0.7	190	2.5
Kentucky	8,432	5,916	70.2	449	5.3	380	4.5	224	2.6	615	7.3	129	1.5	227	2.7	397	4.7	31	0.4	64	0.8
Mississippi	5,101	3,330	65.3	197	3.9	231	4.5	230	4.5	360	7.0	156	3.1	68	1.3	342	6.7	151	3.0	36	0.7
Tennessee	9,338	6,353	68.1	279	3.0	404	4.3	477	5.1	653	7.0	142	1.5	373	4.0	439	4.7	59	0.6	159	1.7
West South Central	47,233	31,545	66.8	2,304	4.9	1,872	4.0	1,923	4.1	2,516	5.3	2,235	4.7	1,009	2.1	3,086	6.5	170	0.4	573	1.2
Arkansas	3,757	2,532	67.4	248	6.6	168	4.5	93	2.5	269	7.1	106	2.8	61	1.6	202	5.4	10	0.3	68	1.8
Louisiana	9,070	6,103	67.3	439	4.8	376	4.2	493	5.4	627	6.9	162	1.8	209	2.3	535	5.9	32	0.4	94	1.0
Oklahoma	6,496	4,458	68.6	498	7.7	223	3.4	187	2.9	344	5.3	214	3.3	96	1.5	424	6.5	31	0.5	21	0.3
Texas	27,910	18,452	66.1	1,119	4.0	1,105	4.0	1,150	4.1	1,276	4.6	1,753	6.3	643	2.3	1,925	6.9	97	0.3	390	1.4

Table 16.--Field of employment of employed registered nurses in each State and region, 1972--Continued

State and region	Total number	Hospital		Nursing home		School of nursing		Private duty		Public health		School nurse		Industrial		Office nurse (physician's or dentist's)		Other specified field		Not reported	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
East North Central	148,842	97,739	65.7	10,613	7.1	5,333	3.6	4,275	2.9	6,204	4.2	3,843	2.6	5,429	3.6	11,371	7.6	969	0.6	3,066	2.1
Illinois	44,223	29,49[illegible]	66.7	2,739	6.2	1,522	3.5	1,522	3.4	1,738	3.9	1,508	3.4	1,570	3.6	3,510	7.9	128	0.3	487	1.1
Indiana	15,539	8,214	52.9	1,108	7.1	497	3.2	515	3.3	555	3.6	617	4.0	660	4.2	1,574	10.1	60	0.4	1,739	11.2
Michigan	29,923	20,605	68.9	1,839	6.1	1,075	3.6	700	2.3	1,393	4.7	462	1.5	1,179	3.9	2,173	7.3	119	0.4	378	1.3
Ohio	40,308	27,035	67.1	2,466	6.1	1,460	3.6	1,275	3.2	1,530	3.8	982	2.4	1,522	3.8	3,100	7.7	620	1.5	318	0.8
Wisconsin	18,849	12,386	65.7	2,461	13.1	779	4.1	263	1.4	988	5.2	274	1.5	498	2.6	1,014	5.4	42	0.2	144	0.8
West North Central	66,356	44,746	67.4	5,548	8.4	2,989	4.5	1,535	2.3	2,457	3.7	2,633	4.0	1,010	1.5	4,413	6.7	334	0.5	691	1.0
Iowa	11,925	7,708	64.6	1,088	9.1	502	4.2	306	2.6	330	2.8	567	4.8	179	1.5	1,014	8.5	171	1.4	60	0.5
Kansas	8,961	6,080	67.8	539	6.0	363	4.1	177	2.0	396	4.4	391	4.4	95	1.1	855	9.5	8	0.1	57	0.6
Minnesota	18,222	12,618	69.2	1,973	10.8	667	3.7	452	2.5	633	3.5	625	3.4	254	1.4	733	4.0	55	0.3	212	1.2
Missouri	14,721	9,926	67.4	751	5.1	781	5.3	359	2.4	669	4.6	702	4.8	385	2.6	898	6.1	40	0.3	210	1.4
Nebraska	6,649	4,637	69.7	463	7.0	381	5.7	125	1.9	182	2.7	230	3.5	80	1.2	440	6.6	39	0.6	72	1.1
North Dakota	2,853	1,936	67.9	316	11.1	150	5.3	66	2.3	109	3.8	29	1.0	10	0.3	188	6.6	8	0.3	41	1.4
South Dakota	3,025	1,841	60.9	418	13.8	145	4.8	50	1.7	138	4.6	89	2.9	7	0.2	285	9.4	13	0.4	39	1.3
Mountain	33,950	22,822	67.2	2,130	6.3	1,112	3.3	854	2.5	1,793	5.3	1,404	4.1	437	1.3	2,826	8.3	234	0.7	338	1.0
Arizona	7,418	4,897	66.0	319	4.3	259	3.5	255	3.4	395	5.3	484	6.5	100	1.4	564	7.6	112	1.5	33	0.5
Colorado	11,634	7,809	67.1	1,042	9.0	335	2.9	275	2.4	603	5.2	377	3.2	177	1.5	831	7.1	60	0.5	125	1.1
Idaho	2,504	1,701	67.9	188	7.5	77	3.1	40	1.6	124	4.9	60	2.4	29	1.2	265	10.6	10	0.4	10	0.4
Montana	3,246	2,110	65.0	267	8.2	99	3.1	112	3.5	173	5.3	64	2.0	14	0.4	367	11.3	4	0.1	36	1.1
Nevada	1,718	1,154	67.2	50	2.9	49	2.8	57	3.3	101	5.9	62	3.6	22	1.3	192	11.2	16	0.9	15	0.9
New Mexico	2,755	1,810	65.7	66	2.4	95	3.5	69	2.5	183	6.6	194	7.0	37	1.4	248	9.0	22	0.8	31	1.1
Utah	3,205	2,339	73.0	105	3.3	158	4.9	33	1.0	157	4.9	65	2.0	44	1.4	214	6.7	5	0.2	85	2.6
Wyoming	1,470	1,002	68.2	93	6.3	40	2.7	13	0.9	57	3.9	98	6.7	14	0.9	145	9.9	5	0.3	3	0.2
Pacific	95,570	62,358	65.2	6,300	6.6	2,738	2.9	3,038	3.2	4,937	5.2	3,386	3.5	1,800	1.9	9,158	9.6	374	0.4	1,481	1.5
Alaska	1,373	818	59.6	66	4.8	18	1.3	9	0.6	141	10.3	78	5.7	9	0.7	193	14.1	6	0.4	35	2.5
California	68,118	45,143	66.3	3,774	5.5	1,921	2.8	2,503	3.7	3,445	5.1	2,708	4.0	1,449	2.1	5,862	8.6	304	0.4	1,009	1.5
Hawaii	3,074	2,060	67.0	144	4.7	59	1.9	96	3.1	189	6.1	49	1.6	39	1.3	372	12.1	12	0.4	54	1.8
Oregon	8,739	5,662	64.8	692	7.9	247	2.8	193	2.2	510	5.9	134	1.5	116	1.3	1,042	11.9	23	0.3	120	1.4
Washington	14,266	8,675	60.8	1,624	11.4	493	3.5	237	1.7	652	4.6	417	2.9	187	1.3	1,689	11.8	29	0.2	263	1.8

Source: Roth, Aleda V., and Walden, Alice R. The Nation's Nurses: 1972 Inventory of Registered Nurses. Kansas City, American Nurses' Association, 1974, p. 41.

Table 17.--Employed registered nurses, by type of position in each State and region, 1972

State and region	Total		Administrator or assistant		Consultant		Supervisor or assistant		Instructor		Head Nurse or assistant		Staff or general duty nurse		Other[1]		Not reported	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
United States	778,470	100.0	29,752	3.8	6,681	.9	80,648	10.4	32,657	4.2	119,905	15.4	432,976	55.6	58,841	7.0	21,010	2.7
New England	69,869	100.0	2,709	3.9	487	.7	6,504	9.3	2,929	4.2	11,223	16.0	37,500	53.7	6,316	9.0	2,201	3.2
Connecticut	17,567	100.0	593	3.4	93	.5	1,197	6.8	654	3.7	2,406	13.7	9,506	54.1	2,461	14.0	657	3.7
Maine	4,700	100.0	196	4.2	21	.5	557	11.8	158	3.4	871	18.5	2,375	50.5	401	8.5	121	2.6
Massachusetts	35,755	100.0	1,416	4.0	285	.8	3,537	9.9	1,655	4.6	6,049	16.9	19,013	53.2	2,662	7.4	1,138	3.2
New Hampshire	4,388	100.0	207	4.7	29	.7	515	11.8	163	3.7	761	17.3	2,296	52.3	314	7.2	103	2.3
Rhode Island	4,631	100.0	162	3.5	26	.5	433	9.4	201	4.3	730	15.8	2,681	57.9	308	6.7	90	1.9
Vermont	2,828	100.0	135	4.8	33	1.2	265	9.4	98	3.4	406	14.3	1,629	57.6	170	6.0	92	3.3
Middle Atlantic	178,910	100.0	5,771	3.2	1,361	.8	16,646	9.3	7,144	4.0	28,202	15.8	96,324	53.8	16,802	9.4	6,660	3.7
New Jersey	30,973	100.0	1,067	3.4	220	.7	2,521	8.2	1,000	3.2	4,222	13.6	17,138	55.4	2,477	8.0	2,328	7.5
New York	89,072	100.0	2,831	3.2	683	.8	8,641	9.7	3,763	4.2	16,137	18.1	44,990	50.5	8,721	9.8	3,306	3.7
Pennsylvania	58,865	100.0	1,873	3.2	458	.8	5,484	9.3	2,381	4.1	7,843	13.3	34,196	58.1	5,604	9.5	1,026	1.7
South Atlantic	107,116	100.0	4,212	3.9	971	.9	10,981	10.3	4,695	4.4	15,650	14.6	57,920	54.1	10,188	9.5	2,499	2.3
Delaware	2,886	100.0	105	3.6	25	.8	239	8.3	176	6.1	370	12.8	1,704	59.1	277	7.9	40	1.4
Dist. of Columbia	4,968	100.0	237	4.8	120	2.4	501	10.1	291	5.8	718	14.5	2,425	48.8	527	10.6	149	3.0
Florida	25,498	100.0	872	3.4	171	.7	2,620	10.3	915	3.6	4,485	17.6	12,880	50.5	2,752	10.8	803	3.1
Georgia	12,353	100.0	675	5.5	109	.9	1,485	12.0	588	4.8	2,036	16.5	5,847	47.3	1,397	11.3	216	1.7
Maryland	14,596	100.0	641	4.4	207	1.4	1,568	10.7	655	4.5	1,891	13.0	8,329	57.1	1,042	7.1	263	1.8
North Carolina	16,573	100.0	728	4.3	140	.9	1,520	9.2	799	4.8	2,036	12.3	9,296	56.1	1,702	10.3	352	2.1
South Carolina	7,790	100.0	274	3.5	74	.9	830	10.6	310	4.0	1,002	12.9	4,391	56.4	693	8.9	216	2.8
Virginia	16,472	100.0	513	3.1	100	.6	1,534	9.3	702	4.3	2,390	14.5	9,506	57.7	1,403	8.5	324	2.0
West Virginia	5,980	100.0	167	2.8	25	.4	684	11.5	259	4.3	722	12.1	3,542	59.2	445	7.4	136	2.3
East South Central	30,624	100.0	1,215	4.0	245	.8	4,111	13.4	1,555	5.1	4,649	15.1	15,634	51.1	2,502	8.2	713	2.3
Alabama	7,753	100.0	336	4.3	55	.7	1,117	14.4	396	5.1	1,184	15.3	3,996	51.6	504	6.5	165	2.1
Kentucky	8,432	100.0	348	4.1	83	1.0	1,095	13.0	416	4.9	1,256	14.9	4,627	54.9	371	4.4	236	2.8
Mississippi	5,101	100.0	172	3.4	38	.7	668	13.1	243	4.8	662	13.0	2,434	47.7	842	16.5	42	.8
Tennessee	9,338	100.0	359	3.8	69	[illegible]	1,231	13.2	500	5.4	1,547	16.6	4,577	49.0	785	8.4	270	2.9
West South Central	47,233	100.0	2,393	5.0	397	.8	7,633	16.2	2,147	4.5	8,607	18.2	21,804	46.2	3,136	6.6	1,116	2.4
Arkansas	3,757	100.0	244	6.5	36	1.0	689	18.3	182	4.8	763	20.3	1,482	39.5	199	5.3	162	4.3
Louisiana	9,070	100.0	358	4.0	57	.6	1,368	15.1	415	4.6	1,535	16.9	4,374	48.2	797	8.8	166	1.8
Oklahoma	6,496	100.0	341	5.3	41	.6	1,178	18.2	276	4.2	1,027	15.8	3,241	49.9	331	5.1	61	.9
Texas	27,910	100.0	1,450	5.2	263	1.0	4,398	15.7	1,274	4.6	5,282	18.9	12,707	45.5	1,809	6.5	727	2.6

Table 17.--Employed registered nurses, by type of position in each State and region, 1972--Continued

State and region	Total		Administrator or assistant		Consultant		Supervisor or assistant		Instructor		Head Nurse or assistant		Staff or general duty nurse		Other[1]		Not reported	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
East North Central	148,842	100.0	5,600	3.8	1,280	.9	14,694	9.8	6,501	4.4	21,540	14.5	89,217	59.9	6,981	4.7	3,029	2.0
Illinois	44,223	100.0	1,756	4.0	502	1.1	4,440	10.0	1,711	3.9	6,392	14.5	25,951	58.6	2,107	4.8	1,364	3.1
Indiana	15,539	100.0	625	4.0	87	.6	1,624	10.5	656	4.2	2,389	15.4	9,095	58.5	770	5.0	293	1.8
Michigan	29,923	100.0	1,191	4.0	242	.8	3,105	10.4	1,437	4.8	4,762	15.9	17,497	58.5	1,232	4.1	457	1.5
Ohio	40,308	100.0	1,231	3.1	297	.7	3,650	9.1	1,778	4.4	5,713	14.2	24,727	61.3	2,251	5.6	661	1.6
Wisconsin	18,849	100.0	797	4.2	152	.8	1,875	10.0	919	4.9	2,284	12.1	11,947	63.4	621	3.3	254	1.3
West North Central	66,356	100.0	2,588	3.9	655	1.0	7,091	10.7	3,242	4.8	8,606	13.0	39,720	59.9	3,011	4.5	1,443	2.2
Iowa	11,925	100.0	483	4.1	85	.7	1,273	10.7	564	4.7	1,311	11.0	7,518	63.0	615	5.2	76	.6
Kansas	8,961	100.0	365	4.1	88	1.0	1,111	12.4	378	4.2	1,460	16.3	5,047	56.3	316	3.5	196	2.2
Minnesota	18,222	100.0	556	3.1	125	.7	1,682	9.2	797	4.4	2,317	12.7	11,416	62.6	869	4.8	460	2.5
Missouri	14,721	100.0	683	4.6	249	1.7	1,683	11.4	781	5.3	1,891	12.8	8,353	56.8	677	4.6	404	2.8
Nebraska	6,649	100.0	247	3.7	70	1.1	711	10.7	398	6.0	799	12.0	4,033	60.6	277	4.2	114	1.7
North Dakota	2,853	100.0	105	3.7	14	.5	321	11.3	165	5.8	402	14.1	1,591	55.8	132	4.6	123	4.2
South Dakota	3,025	100.0	149	4.9	24	.8	310	10.2	159	5.3	426	14.1	1,762	58.3	125	4.1	70	2.3
Mountain	33,950	100.0	1,257	3.7	348	1.0	3,132	9.2	1,201	3.5	4,264	12.6	21,214	62.5	1,633	4.8	901	2.7
Arizona	7,418	100.0	266	3.6	51	.7	590	8.0	279	3.8	1,071	14.4	4,572	61.6	523	7.0	66	.9
Colorado	11,634	100.0	386	3.3	161	1.4	997	8.6	369	3.2	1,363	11.7	7,754	66.6	443	3.8	161	1.4
Idaho	2,504	100.0	88	3.5	10	.4	291	11.6	88	3.5	413	16.5	1,443	57.6	152	6.1	19	.8
Montana	3,246	100.0	134	4.1	29	.9	307	9.5	102	3.1	417	12.8	2,017	62.2	174	5.4	66	2.0
Nevada	1,718	100.0	62	3.6	11	.6	185	10.8	57	3.3	257	15.0	1,013	59.0	89	5.2	44	2.5
New Mexico	2,755	100.0	135	4.9	31	.8	361	13.1	97	3.5	234	8.5	1,443	52.4	138	5.0	326	11.8
Utah	3,205	100.0	116	3.6	52	1.6	262	8.2	166	5.2	365	11.4	1,973	61.5	76	2.4	195	6.1
Wyoming	1,470	100.0	70	4.8	13	.9	139	9.5	43	2.9	144	9.8	999	67.9	38	2.6	24	1.6
Pacific	95,570	100.0	4,007	4.2	937	1.0	9,856	10.3	3,243	3.4	17,164	17.9	53,643	56.1	4,272	4.5	2,448	2.6
Alaska	1,373	100.0	64	4.7	20	1.5	127	9.2	24	1.7	164	11.9	881	64.2	31	2.3	62	4.5
California	68,118	100.0	2,908	4.3	678	1.0	7,220	10.6	2,337	3.4	12,667	18.6	37,330	54.8	3,307	4.8	1,671	2.5
Hawaii	3,074	100.0	112	3.6	35	1.1	268	8.7	77	2.5	377	12.4	1,951	63.5	164	5.3	90	2.9
Oregon	8,739	100.0	411	4.7	66	.8	898	10.3	287	3.3	1,566	17.9	4,972	56.9	343	3.9	196	2.2
Washington	14,266	100.0	512	3.6	138	1.0	1,343	9.4	518	3.6	2,390	16.8	8,509	59.6	427	3.0	429	3.0

[1] Includes private duty nurses.

Source: American Nurses' Association, Statistics Department. Report of 1972 Inventory of Registered Nurses. Kansas City, 1974. Unpublished data.

Table 18.—Employment setting of graduates of nurse practitioner programs who worked as practitioners, 1975

Employment setting	Percent employed
Total [1]	100.0
Hospital practice	7.0
Inpatient	5.8
Emergency	1.2
Ambulatory	63.4
Private practice	14.2
Prepaid group practice	4.0
Hospital based clinic	20.4
Community based clinic	23.2
Other	1.6
Nonhospital Institution	16.2
School for mental/physical handicap	.8
Grades 1-12 public school	6.4
College health program	8.8
Other	.2
Nonhospital community settings	10.0
Health department or home health	9.2
Social services or agency	.6
Other	.2
School of nursing	.4
Extended care facility	1.4
Other	1.6

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[1] Based on data from 753 nurse practitioners who graduated from nurse practitioner programs between May 1974 and June 1975.

Source: Sultz, et al., Longitudinal Study of Nurse Practitioners: Phase II, Division of Nursing, HRA, PHS, DHEW, in preparation.

Table 19.--Field of employment of employed licensed practical nurses in each State and region, 1974

State and region	Total	Field of employment														Not reported	
		Hospital		Nursing home		Private duty		Public health		Industry		Physician's or Dentist's office		Other			
	Number	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
United States	377,889	238,467		65,351		28,210		5,863		2,320		24,497		10,708		2,473	
Number			63.1		17.3		7.5		1.5		0.6		6.5		2.8		0.7
Percent																	
New England	25,284	15,235	60.3	6,283	24.8	1,594	6.3	377	1.5	110	0.4	953	3.8	618	2.4	114	0.5
Connecticut	5,610	3,184	56.7	1,520	27.1	374	6.7	112	2.0	26	0.5	345	6.1	29	0.5	20	0.4
Maine	1,865	1,227	65.8	359	19.3	122	6.5	12	0.6	8	0.4	85	4.6	50	2.7	2	0.1
Massachusetts	12,799	7,577	59.2	3,381	26.4	772	6.0	189	1.5	56	0.4	340	2.7	418	3.3	66	0.5
New Hampshire	1,500	916	61.1	356	23.7	104	6.9	15	1.0	3	0.2	76	5.1	24	1.6	6	0.4
Rhode Island	2,239	1,590	71.0	332	14.8	149	6.7	37	1.6	13	0.6	56	2.5	55	2.5	7	0.3
Vermont	1,271	741	58.3	335	26.4	73	5.7	12	1.0	4	0.3	51	4.0	42	3.3	13	1.0
Middle Atlantic	66,139	39,725	60.1	11,986	18.1	8,354	12.6	1,023	1.6	286	0.4	2,533	3.8	2,035	3.1	197	0.3
New Jersey	9,104	5,921	65.0	1,174	12.9	958	10.5	110	1.2	45	0.5	476	5.2	380	4.0	40	0.5
New York	32,817	19,464	59.3	6,481	19.7	4,142	12.6	579	1.8	133	0.4	1,057	3.2	905	2.8	56	0.2
Pennsylvania	24,218	14,340	59.2	4,331	17.9	3,254	13.4	334	1.4	108	0.5	1,000	4.1	750	3.1	101	0.4
South Atlantic	54,059	35,328	65.4	6,612	12.2	4,993	9.2	897	1.7	364	0.7	4,339	8.0	1,097	2.0	429	0.8
Delaware	823	532	64.6	85	10.3	102	12.4	20	2.4	5	0.6	50	6.1	22	2.7	7	0.9
District of Col.	2,297	1,624	70.7	128	5.6	296	12.9	95	4.1	13	0.6	57	2.5	72	3.1	12	0.5
Florida	12,313	7,101	57.7	1,862	15.1	1,546	12.6	140	1.1	33	0.3	1,176	9.5	165	1.3	290	2.4
Georgia	7,822	4,836	61.8	1,348	17.2	459	5.9	182	2.3	92	1.2	662	8.5	223	2.8	20	0.3
Maryland	5,098	3,410	66.9	727	14.2	468	9.2	86	1.7	32	0.6	243	4.8	116	2.3	16	0.3
North Carolina	8,851	6,244	70.6	816	9.2	665	7.5	76	.9	88	1.0	799	9.0	154	1.7	9	0.1
South Carolina	4,496	2,999	66.7	525	11.7	335	7.4	126	2.8	44	1.0	354	7.9	93	2.1	20	0.4
Virginia	8,928	6,035	67.6	903	10.1	832	9.3	124	1.4	44	0.5	777	8.7	195	2.2	16	0.2
West Virginia	3,431	2,547	74.2	216	6.3	290	8.5	48	1.4	13	0.4	221	6.4	57	1.7	39	0.1
East South Central	27,617	18,699	67.7	3,314	12.0	1,816	6.6	345	1.2	334	1.2	2,239	8.1	595	2.2	275	1.0
Alabama	8,217	5,512	67.1	1,264	15.4	484	5.9	45	.5	76	0.9	643	7.8	95	1.2	98	1.2
Kentucky	5,146	3,468	67.4	584	11.3	359	7.0	81	1.6	67	1.3	420	8.2	146	2.8	21	0.4
Mississippi	4,702	3,158	67.1	562	11.9	309	6.6	65	1.4	38	0.8	366	7.8	201	4.3	3	0.1
Tennessee	9,552	6,561	68.7	904	9.5	664	6.9	154	1.6	153	1.6	810	8.5	153	1.6	153	1.6
West South Central	49,434	30,220	61.1	9,018	18.2	2,946	6.0	937	1.9	279	0.6	4,508	9.1	1,208	2.5	318	0.6
Arkansas	4,959	3,223	65.0	621	12.5	318	6.4	71	1.5	69	1.4	542	10.9	104	2.1	11	0.2
Louisiana	7,460	4,460	59.8	1,240	16.6	786	10.5	171	2.3	47	0.6	596	8.0	148	2.0	12	0.2
Oklahoma	5,462	3,484	63.8	1,178	21.6	212	3.9	92	1.7	30	0.5	334	6.5	110	2.0	2	(1)
Texas	31,553	19,053	60.4	5,979	18.9	1,630	5.0	603	1.9	133	0.4	3,016	9.6	846	2.7	295	0.9

Table 19.--Field of employment of employed licensed practical nurses in each State and region, 1974--Continued

State and region	Total	Field of employment															
		Hospital		Nursing home		Private duty		Public health		Industry		Physician's or Dentist's office		Other		Not reported	
	Number	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
East North Central	70,371	45,230	64.3	13,298	18.9	4,196	6.0	945	1.3	525	0.8	3,302	4.7	2,282	3.2	593	0.8
Illinois	15,173	9,058	59.7	2,841	18.7	1,480	9.7	312	2.1	182	1.2	846	5.6	381	2.5	73	0.5
Indiana	6,200	3,795	61.2	1,248	20.1	366	5.9	84	1.4	73	1.2	496	8.0	120	1.9	18	0.3
Michigan	17,479	12,452	71.2	2,543	14.5	511	2.9	254	1.5	124	0.7	1,382	7.9	98	0.6	115	0.7
Ohio	23,585	15,104	64.0	4,572	19.4	1,694	7.2	240	1.0	55	0.2	180	0.8	1,361	5.8	379	1.6
Wisconsin	7,934	4,821	60.8	2,094	26.4	145	1.8	55	0.7	91	1.1	398	5.0	322	4.1	8	0.1
West North Central	32,154	20,422	63.5	6,416	19.9	1,376	4.3	444	1.4	162	0.5	2,368	7.4	664	2.1	302	0.9
Iowa	5,571	3,314	59.5	1,416	25.4	135	2.4	42	0.8	25	0.4	424	7.6	189	3.4	26	0.5
Kansas	3,140	2,120	67.5	522	16.6	141	4.5	46	1.5	9	0.3	206	6.6	66	2.1	30	0.9
Minnesota	9,092	5,722	63.0	2,067	22.7	228	2.5	89	1.0	20	0.2	783	8.6	155	1.7	28	0.3
Missouri	8,973	5,753	64.1	1,294	14.4	755	8.4	186	2.1	92	1.0	538	6.0	169	1.9	186	2.1
Nebraska	2,805	1,789	63.8	606	21.6	81	2.9	32	1.1	14	0.5	211	7.5	52	1.9	20	0.7
North Dakota	1,392	969	69.6	258	18.5	19	1.4	14	1.0	1	0.1	103	7.4	19	1.4	9	0.6
South Dakota	1,181	755	63.9	253	21.4	17	1.4	35	3.0	1	0.1	103	8.7	14	1.2	3	0.3
Mountain	15,773	10,045	63.7	2,493	15.8	991	6.8	361	2.3	49	0.3	1,282	8.1	478	3.0	74	0.5
Arizona	3,097	1,928	62.3	264	8.5	340	11.0	148	1.8	10	0.3	222	4.2	153	4.9	32	1.0
Colorado	4,448	2,437	54.8	1,090	24.5	328	7.4	56	1.3	13	0.3	367	8.2	137	3.1	20	.4
Idaho	1,982	1,394	70.3	285	14.4	47	2.4	31	1.5	7	0.4	177	8.9	34	1.7	7	0.4
[illegible]	1,412	956	67.7	289	20.5	46	3.3	23	1.6	2	0.1	72	5.1	19	1.3	5	0.4
Nevada	976	710	72.7	87	8.9	60	6.2	11	1.1	1	0.1	85	8.7	19	2.0	3	0.3
New Mexico	1,736	1,159	66.8	145	8.3	104	6.0	74	4.3	3	0.2	178	10.2	70	4.0	3	0.2
Utah	1,636	1,149	70.2	225	13.8	49	3.0	15	0.9	7	0.4	151	9.2	36	2.2	4	0.3
Wyoming	486	312	64.2	108	22.2	17	3.5	3	0.6	6	1.2	30	6.2	10	2.1	0	0.0
Pacific	37,058	23,563	63.6	5,931	16.0	1,944	5.2	534	1.4	211	0.6	2,973	8.0	1,731	4.7	171	0.5
Alaska	391	272	69.6	36	9.2	8	2.0	23	5.9	3	0.8	20	5.1	26	6.6	3	0.8
California	25,976	16,448	63.3	4,039	15.6	1,525	5.9	320	1.2	153	0.6	2,058	7.9	1,326	5.1	107	0.4
Hawaii	1,365	863	63.2	73	5.4	51	3.7	43	3.2	7	0.5	206	15.1	112	8.2	10	0.7
Oregon	3,041	1,997	65.7	498	16.4	89	2.9	71	2.3	20	0.7	293	9.6	63	2.1	10	0.3
Washington	6,285	3,983	63.4	1,285	20.4	271	4.3	77	1.2	28	0.4	396	6.3	204	3.3	41	0.7

Source: Roth, Aleda V. and Schmittling, Gordon T. LPNs: 1974 Inventory of Licensed Practical Nurses. Kansas City, American Nurses' Association, 1977.

Table 20.--Full-time registered nurses and licensed practical/vocational nurses per 1,000 residents in nursing homes, by State and region, 1973

State and region	RN	LPN/LVN
United States	34	47
New England	50	48
Connecticut	60	40
Maine	37	38
Massachusetts	46	54
New Hampshire	64	40
Rhode Island	38	37
Vermont	66	74
Middle Atlantic	55	56
New Jersey	58	41
New York	55	58
Pennsylvania	52	62
South Atlantic	35	52
Delaware	51	31
District of Columbia	34	54
Florida	46	59
Georgia	23	62
Maryland	38	41
North Carolina	29	40
South Carolina	38	53
Virginia	33	49
West Virginia	35	54
East South Central	20	59
Alabama	21	81
Kentucky	19	34
Mississippi	26	72
Tennessee	18	59
West South Central	15	60
Arkansas	19	51
Louisiana	21	59
Oklahoma	16	43
Texas	13	68
East North Central	31	43
Illinois	28	37
Indiana	31	30
Michigan	32	43
Ohio	32	68
Wisconsin	31	30
West North Central	24	30
Iowa	22	31
Kansas	19	20
Minnesota	29	30
Missouri	24	40
Nebraska	21	26
North Dakota	28	21
South Dakota	28	21
Mountain	44	49
Arizona	53	35
Colorado	48	53
Idaho	40	51
Montana	46	45
Nevada	58	67
New Mexico	34	54
Utah	24	50
Wyoming	39	36
Pacific	36	38
Alaska	84	48
California	34	40
Hawaii	63	70
Oregon	35	24
Washington	40	34

Source: Inpatient Health Facilities as Reported from the 1973 MFI Survey, Vital and Health Statistics, Series 14, No. 16, NCHS, HRA, PHS, HEW, 1976.

Table 21.--Distribution of agencies and nurses employed for public health work, January 1974

Type of agency	Number of agencies	Total nurses	Registered nurses Total	Registered nurses Full time	Registered nurses Part time	Licensed practical nurses Total	Licensed practical nurses Full time	Licensed practical nurses Part time
Total	11,516	65,105	61,036	54,008	7,028	4,069	3,606	463
National/Federal agency	10	864	863	799	64	1	1	-
University	303	1,197	1,197	1,049	148	-	-	-
State agency	207	3,055	2,789	2,589	200	266	255	11
Local agency	10,996	59,989	56,187	49,571	6,616	3,802	3,350	452
Official	2,867	25,918	24,240	20,985	3,255	1,678	1,487	191
Health Department	1,810	19,225	18,093	15,763	2,330	1,132	1,051	81
Other official	1,057	6,693	6,147	5,222	925	546	436	110
Organized categorical program	412	2,652	2,110	1,765	345	542	479	63
Mental Health	116	845	720	632	88	125	119	6
Neighborhood health center/OEO	156	722	587	493	94	135	108	27
Other categorical	140	1,085	803	640	163	282	252	30
Combination	51	2,324	2,145	1,946	199	179	164	15
Nonofficial	620	6,709	6,035	4,684	1,351	674	576	98
Visiting Nurse Association	567	6,493	5,830	4,548	1,282	663	567	96
Other nonofficial	53	216	205	136	69	11	9	2
Organized home health	399	2,248	1,859	1,363	496	389	314	75
Hospital based program	239	1,081	984	737	247	97	78	19
Other home health	160	1,167	875	626	249	292	236	56
Board of Education	6,647	20,138	19,798	18,828	970	340	330	10

Source: U.S. Department of Health, Education, and [illegible], Division of Nursing. Survey of Public Health Nursing, 1974. Unpublished preliminary data.

Table 22--Ratios of full-time registered nurses employed for public health work in State and local agencies, with and without local Boards of Education, by State, January 1974

State	State and local agencies including local Boards of Education		State and local agencies excluding local Boards of Education	
	Nurses per 100,000 population	Population per nurse	Nurses per 100,000 population	Population per nurse
U.S. and territories	25.3	3,950	16.1	6,182
Alabama	15.1	6,623	13.7	7,266
Alaska	54.9	1,820	34.6	2,888
Arizona	52.8	1,894	22.2	4,494
Arkansas	17.8	5,590	13.4	7,425
California	22.9	4,364	12.5	7,974
Colorado	34.0	2,939	28.9	3,454
Connecticut	42.7	2,337	24.5	4,069
Delaware	50.7	1,971	20.6	4,850
District of Columbia	44.0	2,271	44.0	2,271
Florida	20.8	4,791	20.5	4,856
Georgia	21.2	4,712	19.2	5,185
Hawaii	27.3	3,659	26.2	3,804
Idaho	28.2	3,545	17.8	5,610
Illinois	14.2	7,034	10.8	9,215
Indiana	17.2	5,802	11.0	9,079
Iowa	22.0	4,526	9.3	10,658
Kansas	24.3	4,114	12.9	7,720
Kentucky	23.9	4,169	22.6	4,415
Louisiana	16.8	5,930	14.8	6,755
Maine	29.6	3,374	22.3	4,468

Table 22--Ratios of full-time registered nurses employed for public health work in State and local agencies, with and without local Boards of Education, by State, January 1974--Continued

State	State and local agencies including local Boards of Education: Nurses per 100,000 population	State and local agencies including local Boards of Education: Population per nurse	State and local agencies excluding local Boards of Education: Nurses per 100,000 population	State and local agencies excluding local Boards of Education: Population per nurse
Maryland	34.5	2,892	31.7	3,153
Massachusetts	35.4	2,822	25.2	3,961
Michigan	15.9	6,281	12.9	7,751
Minnesota	23.5	4,241	11.8	8,455
Mississippi	20.1	4,970	16.2	6,141
Missouri	24.4	4,098	11.3	8,806
Montana	25.3	3,945	17.7	5,645
Nebraska	16.5	6,055	7.7	2,899
Nevada	22.1	4,525	15.5	6,430
New Hampshire	47.1	2,119	26.1	3,822
New Jersey	38.9	2,567	13.6	7,336
New Mexico	38.3	2,605	21.9	4,556
New York	31.3	3,187	16.5	6,052
North Carolina	23.3	4,285	20.3	4,910
North Dakota	15.3	6,502	15.3	6,502
Ohio	20.8	4,802	14.2	7,026
Oklahoma	17.0	5,883	11.3	8,824
Oregon	24.8	4,021	21.3	4,678
Pennsylvania	32.2	3,098	12.3	8,094
Rhode Island	35.9	2,784	20.9	4,781
South Carolina	32.7	3,058	27.2	3,674
South Dakota	21.3	4,686	14.4	6,932
Tennessee	20.9	4,773	19.7	5,056
Texas	23.6	4,223	9.6	10,415
Utah	23.5	4,254	20.6	4,836

Table 22.--Ratios of full-time registered nurses employed for public health work in State and local agencies, with and without local Boards of Education, by State, January 1974--Continued

State	State and local agencies including local Boards of Education		State and local agencies excluding local Boards of Education	
	Nurses per 100,000 population	Population per nurse	Nurses per 100,000 population	Population per nurse
Vermont	65.4	1,526	32.8	3,043
Virginia	26.8	3,724	22.2	4,486
Washington	21.0	4,761	14.5	6,859
West Virginia	19.6	5,085	13.7	7,267
Wisconsin	18.3	5,447	16.0	6,248
Wyoming	23.1	4,317	14.1	7,072
Guam	123.5	809	87.0	1,148
Puerto Rico	29.2	3,419	26.4	3,782
Virgin Islands	148.9	671	116.8	855

Source: U.S. Department of Health, Education, and Welfare, Division of Nursing. Survey of Public Health Nursing, 1974. Unpublished preliminary data.

Table 23.--Bedside nursing personnel[1/] per 100 average daily patients in all AHA hospitals, by census region and type of hospital, 1972

Census region and type of hospital	Number of hospitals	Average daily patient census	Nursing personnel per 100 patients: Total	Registered nurses	Licensed practical nurses	Aides, orderlies, attendants
United States	7,035	1,172,014	74.8	21.5	16.4	36.9
Federal	400	114,757	54.9	17.9	7.9	29.1
Non-Federal	6,635	1,057,347	77.0	21.9	17.3	37.8
Short-term general and allied special	5,832	671,280	99.6	33.5	24.6	41.6
Psychiatric	500	329,046	36.4	1.6	4.1	30.7
Tuberculosis	75	8,214	47.4	4.7	12.8	29.9
Other long term	228	48,807	49.9	5.2	8.6	36.1
Northeast	1,274	347,467	67.4	22.0	13.0	32.4
Federal	56	24,796	48.0	15.1	5.0	27.9
Non-Federal	1,218	322,671	68.9	22.6	13.6	32.7
Short-term general and allied special	967	174,845	94.7	39.7	21.6	33.4
Psychiatric	148	123,249	36.0	1.6	2.8	31.6
Tuberculosis	9	823	54.8	7.3	17.4	30.1
Other long term	94	23,754	52.4	6.2	10.7	35.5
North Central	1,991	319,454	77.8	22.6	15.3	40.0
Federal	79	25,859	50.6	15.4	6.1	29.2
Non-Federal	1,912	293,595	80.2	23.2	16.1	40.9
Short-term general and allied special	1,697	206,963	96.8	32.1	21.4	43.3
Psychiatric	141	72,604	39.8	1.7	2.6	35.5
Tuberculosis	24	1,875	46.2	6.4	10.1	29.7
Other long term	50	12,153	44.9	2.9	6.5	35.5
South	2,426	360,901	74.6	16.0	18.7	39.8
Federal	152	44,886	55.5	18.0	8.8	28.7
Non-Federal	2,274	316,015	77.3	15.7	20.1	41.4
Short-term general and allied special	2,049	200,102	101.9	24.2	30.0	47.7
Psychiatric	138	104,431	33.1	.8	2.5	29.8
Tuberculosis	36	4,774	47.1	2.8	12.6	31.7
Other long term	51	6,708	52.6	3.8	7.9	40.9
West	1,344	144,282	89.3	31.9	22.0	35.4
Federal	113	19,216	68.4	24.7	11.9	31.8
Non-Federal	1,231	125,066	92.5	33.0	23.6	36.0
Short-term general and allied special	1,119	89,370	111.9	44.0	26.0	41.8
Psychiatric	73	28,762	43.0	4.2	20.1	18.6
Tuberculosis	6	742	45.0	10.0	15.2	19.8
Other long term	33	6,192	49.5	9.2	5.3	35.0

[1/] Includes bedside general duty staff working full time plus one-half of those working part time, as of the study week.

Source: U.S. Department of Health, Education, and Welfare, Division of Nursing, Nursing Personnel in Hospitals: 1972 Survey of Hospitals Registered with the American Hospital Association. DHEW Pub. No. (HRA) 75-16. Washington, U.S. Government Printing Office, 1974.

Table 24.--Bedside nursing personnel[1/] per 100 average daily patients in non-Federal short-term general allied and special hospitals, by size of hospital, 1972

Number of beds	Total	RNs	LPNs	Aides, etc.
Total	99.6	33.5	24.6	41.6
6-24	121.2	29.2	23.9	68.1
25-49	104.9	18.9	25.9	60.1
50-99	101.9	21.3	27.4	53.2
100-199	103.2	31.0	27.7	44.4
200-299	102.7	38.7	24.5	39.6
300-399	98.4	38.0	23.1	37.3
400-499	99.3	37.2	24.1	38.0
500-999	96.8	37.1	23.8	36.0
1,000 and over	74.6	21.5	16.0	37.1

1/ Includes bedside general duty staff working full time plus one-half of those working part time, as of the study week.

Source: U.S. Department of Health, Education, and Welfare, Division of Nursing, Nursing Personnel in Hospitals: 1972 Survey of Hospitals Registered with the American Hospital Association. DHEW Publication No. (HRA) 75-16, Washington, U.S. Government Printing Office, 1974.

Table 25.--Bedside nursing personnel per 100 average daily patients in AHA non-Federal short-term general and allied special hospitals, by State, 1972

State	Number of hospitals	Full-time equivalent Nursing personnel per 100 patients			
		Total	Registered nurses	Licensed practical nurses	Aides, orderlies, attendants
United States	5,832	99.6	33.5	24.6	41.6
Alabama	128	102.1	20.7	35.4	45.9
Alaska	14	127.4	56.1	28.4	42.9
Arizona	60	117.2	43.2	24.7	49.3
Arkansas	89	104.9	11.3	40.2	53.4
California	536	111.5	44.4	24.2	42.9
Colorado	78	108.6	47.3	21.3	40.0
Connecticut	41	100.8	41.5	22.9	36.4
Delaware	7	106.4	39.8	26.2	40.3
District of Columbia	14	103.7	42.5	25.3	35.9
Florida	170	102.9	33.2	24.8	44.9
Georgia	146	110.6	24.3	29.0	57.1
Hawaii	22	94.6	43.1	31.1	20.4
Idaho	48	111.5	36.0	48.6	26.9
Illinois	250	95.1	36.7	17.5	40.9
Indiana	112	96.7	28.4	17.5	50.8
Iowa	136	95.3	32.9	19.2	43.2
Kansas	142	100.1	25.8	16.1	58.1
Kentucky	109	99.9	23.4	24.9	51.6
Louisiana	133	106.6	19.7	27.7	59.2
Maine	45	97.8	35.2	25.5	37.0
Maryland	47	106.3	38.8	19.3	48.1
Massachusetts	138	104.1	50.5	23.7	30.0
Michigan	202	95.7	29.7	26.0	40.0
Minnesota	176	103.4	40.2	25.2	38.1
Mississippi	100	103.4	15.3	33.8	54.3
Missouri	129	92.2	23.1	20.3	48.8
Montana	59	102.6	34.0	20.2	48.4
Nebraska	97	111.1	34.0	21.5	55.6
Nevada	18	115.8	34.2	34.7	46.9
New Hampshire	31	109.2	47.3	27.1	34.8

Table 25.--Bedside nursing personnel per 100 average daily patients in AHA non-Federal short-term general and allied special hospitals, by State, 1972--Continued

State	Number of hospitals	Full-time equivalent Nursing personnel per 100 patients			
		Total	Registered nurses	Licensed practical nurses	Aides, orderlies, attendants
New Jersey	107	91.4	39.8	21.1	30.5
New Mexico	41	127.4	37.2	33.3	56.9
New York	334	94.0	36.7	20.0	37.3
North Carolina	135	97.0	26.7	25.5	44.7
North Dakota	56	114.6	32.9	27.1	54.7
Ohio	195	93.6	32.5	25.3	35.8
Oklahoma	121	112.5	17.4	27.4	67.2
Oregon	78	113.0	43.0	23.2	46.9
Pennsylvania	240	88.8	38.4	21.3	29.1
Rhode Island	14	105.5	47.1	33.2	25.2
South Carolina	70	98.1	23.7	26.7	47.7
South Dakota	52	108.9	33.8	22.3	52.8
Tennessee	136	91.6	17.1	30.6	43.9
Texas	477	103.1	20.1	40.6	42.5
Utah	31	107.8	43.2	30.5	34.0
Vermont	17	105.2	47.5	33.4	24.3
Virginia	98	95.5	30.7	25.0	39.8
Washington	107	112.8	49.7	36.2	26.8
West Virginia	69	99.5	24.8	26.6	48.0
Wisconsin	150	97.4	32.4	19.4	45.6
Wyoming	27	118.0	41.4	20.2	56.3

Source: U.S. Department of Health, Education, and Welfare, Division of Nursing. Nursing Personnel in Hospitals: 1972 Survey of Hospitals Registered with the American Hospital Association, DHEW Pub. No. (HRA) 75-16, Washington, U.S. Government Printing Office, 1974.

Table 26.—Latest data on average compensation of full-time nursing personnel, by field of nursing and type of position, 1975-1976

Field of nursing and type of position	Source of data	Date of survey	Coverage	Estimated average annual salary or range of average annual salaries[1]
Hospital[2]	Bureau of Labor Statistics Industry Wage Survey, Hospitals	1975	Non-Federal hospitals in 23 major metropolitan areas	
Nursing aides				$5,556 - $10,213
Licensed practical nurses				7,384 - 11,191
General duty nurses				10,150 - 14,602
Head nurses				11,752 - 16,661
Clinical nurse specialists				12,480 - 17,477
Supervisors				12,605 - 18,054
Directors of nursing				16,848 - 24,005
Nursing home[3]	Bureau of Labor Statistics Industry Wage Survey, Nursing Homes and Related Facilities	1976	Privately owned facilities in 21 major metropolitan areas	
Nursing aides				4,458 - 9,235
Licensed practical nurses				7,134 - 12,256
General duty nurses				9,443 - 14,007
Head nurses				10,046 - 16,162
Community health	NLN, Data on Home Health Agencies and Community Nursing Services	1976	National	
Local official agency				
Nurse directors				18,100
Supervising nurses				15,260
Staff nurses				12,160
Nonofficial agency				
Nurse directors				18,007
Supervising nurses				13,463
Staff nurses				10,932
Board of education				
Supervising nurses				17,600
Staff nurses				12,901
All public health agencies				
Licensed practical nurses				8,371
Public health assistants				7,615
Home health aides				6,366
Other auxiliary personnel				7,162
Industrial registered nurses	Bureau of Labor Statistics Occupational Earnings in all Metropolitan Areas	1976	All metropolitan areas	12,376
Office nurses, R.N.	Owens, Arthur. "Are You Paying Your Office Assistant Enough?" Medical Economics, March 1977	1976	National	9,724
Nursing education, R.N.	ANA, Preliminary Report on Survey of Salaries of Nursing Faculty and and Administrators in Nursing Educational Programs (RN)	1976	National	
Baccalaureate programs				13,872
Associate degree programs				13,400
Diploma programs				13,650
Practical nurse programs				13,192

1/ For the hospital and nursing home fields, this is the range of estimated average salaries among the metropolitan areas covered in the studies.

2/ Estimated average annual salary was converted from hourly earnings, based on average standard workweek in each metropolitan area from 1972 hospital survey. Standard 40-hour week was assumed for certain localities and positions not surveyed in 1972.

3/ Estimated average annual salary was converted from hourly earnings, based on average standard workweek in each metropolitan area as indicated by data in 1976 nursing home survey.

Table 27.—Projected requirements for full-time equivalent registered nurses in each State and region, by educational preparation, 1982

State and region	Lower bound					Upper bound				
	Total	AD & Dip.	Bacc.	Master's	Doct.	Total	AD & Dip.	Bacc.	Master's	Doct.
New England	78,462	27,834	36,712	12,908	1,008	109,566	36,953	50,922	19,532	2,159
Connecticut	17,[illegible]6	6,255	8,561	2,860	220	25,070	8,361	11,917	4,310	482
Maine	5,784	2,034	2,624	1,065	61	8,231	2,732	3,737	1,619	143
Massachusetts	40,502	14,376	18,869	6,711	546	56,518	19,126	26,126	10,117	1,149
New Hampshire	5,649	2,049	2,633	903	64	7,839	2,684	3,626	1,388	141
Rhode Island	5,810	2,121	2,741	866	82	7,961	2,731	3,726	1,334	170
Vermont	2,821	999	1,284	503	35	3,947	1,319	1,790	764	74
Middle Atlantic	220,391	78,829	105,[illegible]09	33,204	2,749	301,579	101,664	143,507	50,444	5,964
New Jersey	38,058	13,687	18,278	5,733	360	52,345	17,718	25,034	8,716	877
New York	113,441	40,329	54,311	17,207	1,594	154,645	51,733	73,508	26,087	3,317
Pennsylvania	68,892	24,813	33,020	10,264	795	94,589	32,213	44,965	15,641	1,770
South Atlantic	181,764	65,616	87,279	26,912	1,957	249,699	84,537	119,417	41,232	4,513
Delaware	3,742	1,340	1,783	566	53	5,036	1,693	2,370	862	111
District of Columbia	6,865	2,541	3,182	997	145	9,201	3,195	4,212	1,526	268
Florida	47,632	17,798	23,110	6,346	378	65,229	22,874	31,515	9,831	1,009
Georgia	25,883	9,224	12,262	4,134	263	36,975	12,487	17,510	6,346	[illegible]
Maryland	22,197	7,983	10,693	3,263	258	30,855	10,398	14,830	5,033	594
North Carolina	27,263	9,586	13,162	4,158	357	36,667	12,071	17,584	6,272	7[illegible]0
South Carolina	13,4[illegible]3	4,677	6,500	2,104	142	18,570	6,053	8,960	3,226	331
Virginia	24,442	8,723	11,699	3,765	255	33,344	11,101	15,936	5,718	589
West Virginia	10,317	3,744	4,888	1,579	106	13,822	4,665	6,500	2,418	239

Table 27.— Projected requirements for full-time equivalent registered nurses in each State and region, by educational preparation, 1982—Continued

East South Central	70,982	25,143	33,505	11,477	857	97,150	32,265	45,636	17,413	1,836
Alabama	19,112	6,804	9,002	3,055	251	26,480	8,862	12,426	4,669	523
Kentucky	16,832	5,924	7,902	2,798	208	22,809	7,500	10,678	4,194	437
Mississippi	11,600	4,078	5,444	1,945	133	16,207	5,323	7,592	2,997	295
Tennessee	23,438	8,337	11,157	3,679	265	31,654	10,580	14,940	5,553	581
West South Central	112,673	39,987	53,067	18,285	1,334	158,238	52,891	74,497	27,893	2,957
Arkansas	11,849	4,263	5,571	1,895	120	16,613	5,649	7,790	2,892	282
Louisiana	19,484	6,913	9,143	3,176	252	27,263	9,048	12,826	4,852	537
Oklahoma	14,520	5,123	6,743	2,491	163	20,923	6,995	9,732	3,826	370
Texas	66,820	23,688	31,610	10,723	799	93,439	31,199	44,149	16,323	1,768
East North Central	229,056	80,998	110,208	35,225	2,625	314,375	105,226	150,123	53,182	5,844
Illinois	63,587	22,599	30,937	9,362	689	86,440	29,045	41,680	14,148	1,567
Indiana	29,175	10,244	13,902	4,645	384	39,979	13,278	18,907	6,990	804
Michigan	47,947	16,959	23,364	7,113	511	65,721	21,892	31,843	10,806	1,180
Ohio	61,247	21,680	29,428	9,502	637	83,618	28,050	39,824	14,275	1,469
Wisconsin	27,100	9,516	12,577	4,603	404	38,617	12,961	17,869	6,963	824
West North Central	101,439	36,075	47,238	16,903	1,223	141,894	47,825	65,765	25,650	2,654
Iowa	16,637	5,851	7,673	2,906	207	23,325	7,786	10,719	4,381	439
Kansas	13,463	4,844	6,228	2,242	149	18,757	6,350	8,637	3,435	335
Minnesota	25,526	9,124	11,918	4,168	316	36,052	12,302	16,734	6,329	687
Missouri	28,364	10,124	13,591	4,351	298	38,945	13,129	18,544	6,589	683
Nebraska	8,933	3,153	4,099	1,571	110	12,780	4,283	5,862	2,394	241
North Dakota	4,070	1,456	1,786	758	70	5,709	1,923	2,503	1,153	130
South Dakota	4,446	1,523	1,943	907	73	6,326	2,052	2,766	1,369	139
Mountain	49,958	17,711	23,533	8,075	639	69,214	22,873	32,655	12,313	1,373
Arizona	11,873	4,189	5,689	1,826	169	16,231	5,298	7,798	2,784	351
Colorado	14,102	5,059	6,650	2,229	164	19,920	6,741	9,403	3,405	371
Idaho	3,763	1,341	1,759	629	34	5,302	1,769	2,483	964	86
Montana	4,700	1,657	2,104	866	73	6,441	2,127	2,874	1,298	142
Nevada	3,577	1,265	1,754	515	43	4,776	1,577	2,323	782	94
New Mexico	4,835	1,697	2,291	801	46	6,724	2,157	3,215	1,239	113
Utah	5,227	1,825	2,424	888	90	7,189	2,323	3,359	1,337	170
Wyoming	1,881	678	862	321	20	2,631	881	1,200	504	46
Pacific	140,854	50,609	67,041	21,678	1,526	197,964	66,948	94,545	32,905	3,566
Alaska	1,656	602	802	238	14	2,307	753	1,128	389	37
California	107,907	38,937	51,728	16,144	1,098	150,492	51,068	72,324	24,472	2,628
Hawaii	3,801	1,416	1,818	536	31	5,154	1,771	2,473	828	82
Oregon	10,624	3,806	4,928	1,776	114	15,158	5,126	7,062	2,700	270
Washington	16,866	5,848	7,765	2,984	269	24,853	8,230	11,558	4,516	549

1/ Source: Lum and Leonhard, Analysis and Planning for Improved Distribution of Nursing Personnel and Services, Panel of Expert Consultants' Final Report, Western Interstate Commission for Higher Education, 1977. In press.

Table 28.--Projected requirements for licensed practical nurses and nursing aides in each State and region, 1982

State and region	LPN		Aides	
	Lower bound	Upper bound	Lower bound	Upper bound
New England	29,455	44,149	33,590	46,615
Connecticut	6,897	10,458	7,856	11,029
Maine	2,247	3,412	2,509	3,562
Massachusetts	15,505	23,326	17,643	24,566
New Hampshire	1,980	2,898	2,281	3,086
Rhode Island	1,832	2,609	2,178	2,848
Vermont	994	1,446	1,123	1,524
Middle Atlantic	69,659	97,789	86,174	109,224
New Jersey	11,931	16,983	14,482	18,836
New York	35,003	48,158	44,505	54,729
Pennsylvania	22,725	32,648	27,187	35,659
South Atlantic	55,970	80,532	66,797	86,585
Delaware	1,032	1,427	1,182	1,502
District of Columbia	1,715	2,244	2,350	2,655
Florida	15,173	22,138	17,395	23,176
Georgia	10,327	15,962	11,835	16,800
Maryland	7,450	10,793	9,002	11,691
North Carolina	6,981	9,627	8,401	10,360
South Carolina	4,026	5,720	5,043	6,370
Virginia	6,736	9,330	8,409	10,368
West Virginia	2,530	3,291	3,180	3,663
East South Central	21,224	30,358	25,100	32,778
Alabama	6,428	9,479	7,378	10,041
Kentucky	4,574	6,521	5,251	6,816
Mississippi	3,695	5,282	4,629	5,971
Tennessee	6,527	9,076	7,842	9,950

Table 28.--Projected requirements for licensed practical nurses and nursing aides in each State and region, 1982--continued

State and region	LPN		Aides	
	Lower bound	Upper bound	Lower bound	Upper bound
West South Central	41,362	63,357	45,721	65,349
Arkansas	4,587	7,115	4,865	7,200
Louisiana	6,698	10,095	7,411	10,322
Oklahoma	6,284	9,880	6,924	10,233
Texas	23,793	36,267	26,521	37,594
East North Central	76,554	112,879	86,667	118,780
Illinois	20,129	29,126	22,672	30,490
Indiana	9,425	13,782	11,030	14,940
Michigan	15,499	22,818	17,237	23,401
Ohio	19,359	28,347	22,219	30,153
Wisconsin	12,142	18,806	13,509	19,796
West North Central	39,152	59,265	44,062	62,500
Iowa	6,600	10,038	7,380	10,602
Kansas	5,028	7,510	5,731	7,908
Minnesota	10,868	16,620	12,277	17,752
Missouri	9,447	14,055	10,631	14,621
Nebraska	3,845	5,986	4,154	6,163
North Dakota	1,583	2,363	1,796	2,521
South Dakota	1,781	2,693	2,093	2,933
Mountain	16,108	23,971	17,622	24,159
Arizona	3,326	4,816	3,590	4,660
Colorado	5,500	8,481	6,004	8,609
Idaho	1,374	2,114	1,432	2,108
Montana	1,500	2,217	1,585	2,232
Nevada	854	1,185	951	1,203
New Mexico	1,471	2,118	1,696	2,165
Utah	1,462	2,165	1,591	2,189
Wyoming	621	875	773	993

Table 28.--Projected requirements for licensed practical nurses and nursing aides in each State and region, 1982--continued

State and region	LPN		Aides	
	Lower bound	Upper bound	Lower bound	Upper bound
Pacific	53,562	82,036	57,688	82,352
Alaska	440	646	488	602
California	39,151	59,492	41,956	59,266
Hawaii	1,076	1,487	1,137	1,458
Oregon	4,485	6,840	5,131	7,275
Washington	8,410	13,571	8,976	13,751

1/ Source: Lum and Leonhard, Analysis and Planning for Improved Distribution of Nursing Personnel and Services, Panel of Expert Consultants' Final Report, Western Interstate Commission for Higher Education, 1977. In press.

Table 29.--Projected requirements for full-time equivalent registered nurses in each State and region according to various health system changes, 1985[1]

State and region	Baseline	Liberal national health insurance	High role reformulation	Combination of system changes
New England	83,625	91,646	84,159	93,805
Connecticut	20,143	22,329	20,436	23,369
Maine	5,740	6,297	7,033	7,793
Massachusetts	43,255	46,927	42,206	45,989
New Hampshire	5,626	6,416	5,611	6,746
Rhode Island	5,619	5,981	5,626	6,134
Vermont	3,242	3,696	3,247	3,774
Middle Atlantic	213,376	230,707	215,273	235,774
New Jersey	39,066	43,993	39,349	44,999
New York	103,571	109,867	104,888	112,272
Pennsylvania	70,739	76,847	71,036	78,503
South Atlantic	154,323	178,769	166,906	205.492
Delaware	3,416	3,846	3,528	4,165
District of Columbia	6,129	6,280	6,165	5,862
Florida	43,184	49,643	47,302	58,622
Georgia	18,828	21,411	21,721	26,327
Maryland	21,534	24,843	21,002	25,586
North Carolina	22,086	26,564	24,316	31,157
South Carolina	10,365	12,388	11,579	14,837
Virginia	21,645	25,966	23,151	29,924
West Virginia	7,136	7,828	8,142	9,012
East South Central	43,820	49,986	52,986	63,292
Alabama	11,745	13,303	14,196	16,902
Kentucky	10,463	12,058	12,131	14,670
Mississippi	7,247	8,490	9,013	10,995
Tennessee	14,365	16,135	17,646	20,725

Table 29.--Projected requirements for full-time equivalent registered nurses in each State and region according to various health system changes, 1985[1]--continued

State and region	Baseline	Liberal national health insurance	High role reformulation	Combination of system changes
West South Central	70,988	83,382	85,624	107,050
Arkansas	5,972	6,968	7,787	9,809
Louisiana	12,528	14,956	15,027	19,007
Oklahoma	9,310	10,723	11,296	13,588
Texas	43,178	50,735	51,514	64,646
East North Central	189,555	213,453	200,040	231,240
Illinois	56,033	62,755	57,491	65,999
Indiana	21,394	25,100	23,143	27,924
Michigan	38,640	42,947	41,693	47,318
Ohio	50,213	57,101	53,058	62,061
Wisconsin	23,275	25,550	24,655	27,938
West North Central	83,140	93,676	89,597	103,043
Iowa	14,086	16,202	14,775	17,466
Kansas	10,693	12,490	11,817	14,172
Minnesota	22,711	25,213	23,445	26,760
Missouri	20,671	22,740	23,403	26,374
Nebraska	7,978	8,970	8,614	9,699
North Dakota	3,407	3,870	3,700	4,146
South Dakota	3,594	4,191	3,843	4,426
Mountain	49,130	57,737	51,436	63,622
Arizona	12,949	15,596	13,643	17,798
Colorado	15,183	17,029	15,354	18,079
Idaho	3,266	3,973	3,515	4,186
Montana	3,827	4,604	4,062	4,870
Nevada	2,943	3,530	3,253	4,262
New Mexico	4,450	5,256	4,870	6,106
Utah	4,770	5,674	4,925	6,263
Wyoming	1,742	2,075	1,814	2,058

Table 29.--Projected requirements for full-time equivalent registered nurses in each State and region according to various health system changes, 1985[1]--continued

State and region	Baseline	Liberal national health insurance	High role reformulation	Combination of system changes
Pacific	130,230	141,129	131,365	140,224
Alaska	1,717	2,317	1,719	2,331
California	97,701	105,292	98,761	104,741
Hawaii	4,316	4,868	4,324	4,685
Oregon	10,974	12,991	11,135	13,207
Washington	15,522	15,661	15,426	15,260

[1] See chapter 1 for description of health system changes.

Source: Doyle, et al., The Effect of Changes in the Health System by 1985 on 1985 Requirements for Registered Nurses by State. In preparation.

Table 30.--Projected active supply of registered nurses in each State and region (Series I), selected years 1977-1985.

State and region	1977				1980				1982				1985			
	Total RNs		FTE RNs		Total RNs		FTE RNs		Total RNs		FTE RNs		Total RNs		FTE RNs	
	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/
New England	90,000	727	71,000	574	100,800	796	79,700	629	108,100	839	85,200	[illegible]	118,700	897	93,300	705
Connecticut	21,100	666	16,200	511	23,700	729	18,200	681	25,500	773	19,500	[illegible]	28,100	826	21,400	629
Maine	5,900	561	4,700	450	6,500	611	5,200	488	6,900	638	5,500	505	7,600	678	6,000	538
Massachusetts	47,800	809	37,800	640	53,500	889	42,400	704	57,300	938	45,400	743	62,700	1,004	49,500	792
New Hampshire	5,600	683	4,600	561	6,300	730	5,100	592	6,800	763	5,500	619	7,500	804	6,100	654
Rhode Island	5,700	593	4,500	468	6,200	637	5,000	512	6,500	661	5,200	525	7,000	693	5,600	555
Vermont	3,900	819	3,200	669	4,600	931	3,800	769	5,100	1,003	4,100	812	5,800	1,107	4,700	899
Middle Atlantic	221,500	584	182,200	[illegible]	244,100	636	201,000	524	259,300	668	213,300	550	280,500	712	230,400	585
New Jersey	40,500	540	31,900	425	45,600	592	35,900	465	49,300	628	38,700	494	54,700	678	42,800	530
New York	106,300	576	88,900	481	115,700	622	96,900	751	121,700	648	101,900	542	129,400	680	108,300	569
Pennsylvania	74,700	624	61,400	513	82,800	688	68,200	567	88,300	725	72,700	597	96,400	784	79,300	645
South Atlantic	152,100	455	131,700	394	184,300	527	159,500	457	206,500	574	178,200	495	238,300	634	205,400	547
Delaware	3,900	669	3,200	547	4,800	793	4,000	659	5,400	877	4,500	726	6,300	982	5,200	809
District of Columbia	6,200	854	5,500	763	6,900	977	6,100	867	7,400	1,043	6,500	922	8,000	1,156	7,100	1,023
Florida	36,600	449	31,900	391	43,200	487	37,600	424	47,800	514	41,500	446	54,500	544	47,100	470
Georgia	19,100	387	17,200	347	25,700	500	23,000	448	30,400	576	27,200	515	37,100	678	33,100	605
Maryland	21,300	508	17,600	420	25,300	579	20,900	479	28,100	630	23,100	518	32,200	694	26,500	571
North Carolina	22,800	424	20,000	372	27,400	496	24,100	436	30,500	538	26,700	472	34,700	594	30,400	521
South Carolina	10,700	389	9,500	344	13,200	462	11,700	411	14,800	505	13,000	444	17,100	565	15,100	499
Virginia	23,200	471	19,500	396	28,000	550	23,600	463	31,400	602	26,400	506	36,400	672	30,500	563
West Virginia	8,300	468	7,300	409	9,800	550	8,500	477	10,700	593	9,300	513	12,000	659	10,400	570
East South Central	44,000	327	39,200	291	53,600	390	47,600	347	59,900	428	53,200	380	68,600	478	60,900	424
Alabama	11,000	307	9,900	276	13,400	367	12,000	329	15,000	403	13,400	360	17,100	449	15,300	402
Kentucky	11,900	352	10,300	306	14,400	418	12,400	361	16,100	458	13,900	396	18,400	512	15,900	442
Mississippi	7,500	325	6,900	298	9,600	406	8,800	373	10,900	453	10,000	416	12,800	519	11,700	476
Tennessee	13,600	326	12,100	290	16,200	378	14,400	336	17,900	410	15,900	364	20,300	450	18,000	400

Table 30.--Projected active supply of registered nurses in each State and region (Series 1), selected years 1977-1985--Continued

State and region	1977				1980				1982				1985			
	Total RNs		FTE RNs		Total RNs		FTE RNs		Total RNs		FTE RNs		Total RNs		FTE RNs	
	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/	Number	RNs per 100,000 pop. 1/
West South Central	67,500	325	60,200	290	84,500	393	75,300	350	96,200	437	85,600	388	112,900	[illegible]	100,400	439
Arkansas	5,700	277	5,100	246	7,200	340	6,400	300	8,300	380	7,300	334	9,800	[illegible]	8,600	380
Louisiana	12,200	320	10,800	284	15,000	384	13,200	339	16,900	[illegible]	[illegible]	376	19,600	482	17,300	425
Oklahoma	9,200	336	8,100	297	11,500	410	10,200	363	13,100	457	[illegible]	[illegible]	15,400	519	13,600	458
Texas	49,400	332	36,200	298	50,800	401	45,500	359	57,900	[illegible]	[illegible]	398	68 100	503	60,900	448
East North Central	190,800	458	163,100	391	214,900	507	183,500	433	231,100	537	197,100	458	253,900	578	216,000	491
Illinois	52,000	457	43,300	381	56,100	488	46,800	407	59,000	507	[illegible]	427	63,200	533	52,600	444
Indiana	20,400	376	16,800	310	23,100	417	19,000	343	24,800	441	20,400	368	27,200	471	22,200	385
Michigan	41,200	444	33,400	360	47,200	496	38,100	401	51,200	530	41,300	435	56,900	575	45,800	462
Ohio	52,600	481	50,500	461	59,200	534	56,800	512	63,600	565	60,900	541	69,600	608	66,700	583
Wisconsin	24,600	509	19,100	411	29,300	615	22,800	479	32,500	671	25,300	522	37,000	744	28,700	576
West North Central	86,400	512	70,200	416	98,200	574	79,500	464	105,800	608	85,700	493	116,200	656	93,800	529
Iowa	14,800	514	11,900	412	16,800	577	13,400	462	18,000	612	14,400	490	19,700	663	15,700	528
Kansas	11,300	494	9,600	420	12,800	557	10,800	473	13,900	594	11,700	501	15,300	648	12,900	545
Minnesota	24,800	621	19,400	486	28,100	688	22,000	539	30,300	730	23,700	571	33,300	781	25,900	608
Missouri	19,100	393	16,000	330	21,600	438	18,100	367	23,200	464	19,500	389	25,500	499	21,300	417
Nebraska	8,900	577	7,300	470	10,500	662	8,500	537	11,500	713	9,300	577	12,900	782	10,400	630
North Dakota	3,300	531	2,700	429	3,500	545	2,800	442	3,500	547	2,900	450	3,600	555	2,900	445
South Dakota	4,200	613	3,300	485	4,900	715	3,900	569	5,400	769	4,200	603	5,900	845	4,700	668
Mountain	47,800	505	42,000	444	57,400	571	50,4000	501	63,900	612	56,000	536	73,100	660	64,200	580
Arizona	12,400	572	12,000	553	15,100	635	14,600	616	17,000	680	16,500	662	19,800	735	19,200	711
Colorado	15,800	631	13,600	542	18,400	688	16,700	587	20,000	721	17,100	617	22,400	760	19,100	707
Idaho	3,400	423	2,800	352	3,900	467	3,200	384	[illegible]	496	3,500	406	4,800	534	3,900	432
Montana	4,100	554	3,200	435	4,600	611	3,700	492	5,000	644	3,900	507	5,500	691	4.300	544
Nevada	2,700	462	2,400	408	4,100	631	3,600	559	5,000	740	4,400	655	6,300	868	5,600	769
New Mexico	3,400	307	3,000	268	4,500	384	3,900	334	5,200	431	4,500	373	6,100	487	5,300	421
Utah	4,200	355	3,500	295	4,800	385	4,000	320	5,200	405	4,300	333	5,800	428	4,800	354
Wyoming	1,800	509	1,500	419	2,000	551	1,700	462	2,200	575	1,800	476	2,400	614	2,000	511
Pacific	117,500	414	99,900	352	131,100	444	111,300	377	140,700	466	119,100	394	154,800	492	130,600	415
Alaska	2,500	745	2,100	634	3,300	938	2,900	822	4,000	1,083	3,400	926	5,100	1,316	4,400	1,128
California	81,000	379	69,400	325	88,800	399	76,000	341	94,100	414	80,400	353	101,900	430	86,800	366
Hawii	3,900	469	3,600	433	4,300	494	4,000	459	4,600	511	4,200	467	5,000	536	4,600	488
Oregon	11,400	494	9,300	404	13,400	559	10,900	453	14,900	603	12,100	490	17,000	657	13,700	531
Washington	18,700	528	15,500	437	21,300	584	17,500	480	[illegible]	623	19,000	512	25,800	674	21,100	552

1/ State population estimates projected by Vector Research, Inc.
Source: Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education and Welfare, 1977.
Note: FTE = full-time equivalent.

Table 31.--Projected active supply of registered nurses in each State and region by educational preparation, (Series I), selected years, 1977-1985

State and region	1977			1980			1982			1985		
	Total[1/]	AD & Dip.	Bacc. & above	Total[1/]	AD & Dip.	Bacc. & above	Total[1/]	AD & Dip.	Bacc. & above	Total[1/]	AD & Dip.	Bacc. & above
New England	90,000	73,400	16,500	100,800	79,300	21,600	108,200	83,000	25,300	118,700	87,700	30,900
Connecticut	21,100	17,200	3,900	23,700	18,600	5,100	25,500	19,500	6,000	28,100	20,600	7,500
Maine	5,900	5,200	600	6,500	5,700	800	7,000	6,000	1,000	7,600	6,400	1,200
Massachusetts	47,800	38,500	9,300	53,500	41,400	12,200	57,300	43,100	14,200	62,700	45,300	17,400
New Hampshire	5,600	4,800	800	6,300	5,300	1,000	6,800	5,600	1,200	7,500	6,100	1,400
Rhode Island	5,700	4,500	1,200	6,200	4,600	1,600	6,500	4,700	1,900	7,000	4,700	2,300
Vermont	3,900	3,200	700	4,600	3,700	900	5,100	4,100	1,000	5,800	4,600	1,100
Middle Atlantic	221,500	175,500	46,100	244,100	185,500	58,700	259,300	190,900	68,500	280,500	197,200	83,400
New Jersey	40,500	32,500	8,000	45,600	35,800	9,800	49,300	38,000	11,300	54,700	41,000	13,800
New York	106,300	82,400	24,000	115,700	85,200	30,600	121,700	86,200	35,600	129,400	86,900	42,500
Pennsylvania	74,700	60,600	14,100	82,800	64,500	18,300	88,300	66,700	21,600	96,400	69,300	27,100
South Atlantic	152,100	123,800	28,500	184,300	146,100	38,200	206,400	161,200	45,300	238,300	182,400	56,000
Delaware	3,900	3,100	800	4,800	3,600	1,200	5,400	4,000	1,500	6,300	4,500	1,800
District of Columbia	6,200	4,000	2,200	6,900	4,200	2,700	7,400	4,300	3,100	8,000	4,400	3,600
Florida	36,600	31,700	4,900	43,200	37,400	5,800	47,800	41,300	6,500	54,500	47,000	7,500
Georgia	19,100	15,500	3,600	25,700	20,600	5,100	30,300	24,200	6,200	37,100	29,300	7,800
Maryland	21,300	15,900	5,400	25,300	18,200	7,100	28,100	19,900	8,200	32,200	22,300	10,000
North Carolina	22,800	18,500	4,300	27,400	21,300	6,100	30,500	23,000	7,400	34,700	25,300	9,400
South Carolina	10,700	8,900	1,900	13,200	10,500	2,700	14,800	11,500	3,300	17,100	12,900	4,200
Virginia	23,200	18,700	4,500	28,000	21,600	6,400	31,400	23,500	7,900	36,400	26,100	10,300
West Virginia	8,300	7,500	900	9,800	8,700	1,100	10,700	9,500	1,200	12,000	10,600	1,400
East South Central	44,000	36,200	7,900	53,600	42,300	11,300	59,900	46,100	13,700	68,600	51,200	17,400
Alabama	11,000	9,000	2,000	13,400	10,300	3,100	15,000	11,100	3,900	17,100	12,100	5,000
Kentucky	11,900	9,700	2,200	14,400	11,400	3,000	16,100	12,400	3,600	18,400	13,900	4,500
Mississippi	7,500	6,300	1,300	9,600	7,600	2,000	10,900	8,400	2,500	12,800	9,500	3,300
Tennessee	13,600	11,200	2,400	16,200	13,000	3,200	17,900	14,200	3,700	20,300	15,700	4,600

Table 31.--Projected active supply of registered nurses in each State and region by educational preparation, (Series I), selected years, 1977-1985--Continued

State and region	1977			1980			1982			1985		
	Total 1/	AD & Dip.	Bacc. & above	Total 1/	AD & Dip.	Bacc. & above	Total 1/	AD & Dip.	Bacc. & above	Total 1/	AD & Dip.	Bacc. & above
West South Central	67,500	50,400	17,000	84,500	61,000	23,500	96,200	68,000	28,400	112,900	77,300	35,600
Arkansas	5,700	4,900	800	7,200	6,200	1,000	8,300	7,200	1,100	9,800	8,500	1,300
Louisiana	12,200	9,000	3,200	15,000	10,800	4,200	16,900	12,100	4,900	19,600	13,800	5,800
Oklahoma	9,200	7,300	1,800	11,500	9,000	2,500	13,100	10,200	3,000	15,400	11,700	3,700
Texas	40,400	29,200	11,200	50,800	35,000	15,800	57,900	38,500	19,400	68,100	43,300	24,800
East North Central	190,800	153,300	37,400	214,900	166,900	48,100	231,100	175,100	55,900	253,900	185,700	68,200
Illinois	52,000	40,400	11,500	56,100	41,700	14,500	59,000	42,300	16,700	63,200	42,800	20,400
Indiana	20,400	16,300	4,100	23,100	17,900	5,200	24,800	18,900	5,900	27,200	20,300	6,900
Michigan	41,200	33,400	7,800	47,200	37,200	10,000	51,200	39,500	11,600	56,900	42,700	14,200
Ohio	52,600	44,400	8,200	59,200	48,800	10,400	63,600	51,500	12,100	69,600	54,800	14,600
Wisconsin	24,600	18,800	5,800	29,300	21,300	8,000	32,500	22,900	9,600	37,000	25,100	11,900
West North Central	86,400	68,900	17,300	98,200	76,000	22,100	105,800	80,400	25,400	116,200	86,300	30,100
Iowa	14,800	12,500	2,300	16,800	13,800	3,000	18,000	14,500	3,500	19,700	15,400	4,300
Kansas	11,300	8,900	2,300	12,800	9,800	3,000	13,900	10,400	3,500	15,300	11,100	4,300
Minnesota	24,800	19,200	5,600	28,100	21,200	6,900	30,300	22,500	7,800	33,300	24,300	9,000
Missouri	19,100	15,200	3,800	21,600	16,800	4,800	23,200	17,800	5,500	25,500	19,100	6,400
Nebraska	8,900	7,200	1,800	10,500	7,900	2,600	11,500	8,400	3,100	12,900	9,100	3,800
North Dakota	3,300	2,600	700	3,500	2,600	800	3,500	2,600	900	3,600	2,600	1,000
South Dakota	4,200	3,300	800	4,900	3,900	1,000	5,400	4,200	1,100	5,900	4,700	1,300
Mountain	47,800	35,100	12,900	57,400	40,900	16,500	71,900	44,500	19,200	73,100	50,100	23,200
Arizona	12,400	9,200	3,200	15,100	10,600	4,500	17,000	11,500	5,500	19,800	12,900	7,000
Colorado	15,800	11,000	4,800	18,400	12,200	6,200	20,000	12,800	7,100	22,400	13,800	8,600
Idaho	3,400	2,900	500	3,900	3,300	600	4,300	3,500	700	4,800	4,000	900
Montana	4,100	3,000	1,000	4,600	3,400	1,200	5,000	3,600	1,400	5,500	3,900	1,600
Nevada	2,700	2,100	700	4,100	3,200	900	5,000	4,000	1,000	6,300	5,100	1,200
New Mexico	3,400	2,600	800	4,500	3,400	1,000	5,200	4,000	1,200	6,100	4,800	1,300
Utah	4,200	2,900	1,400	4,800	3,300	1,600	5,200	3,500	1,700	5,800	3,900	1,900
Wyoming	1,800	1,400	500	2,000	1,500	500	2,200	1,600	600	2,400	1,700	700
Pacific	117,600	85,400	32,100	131,100	92,900	38,300	140,700	97,900	42,900	154,800	104,900	49,900
Alaska	2,500	1,600	900	3,300	2,000	1,300	4,000	2,300	1,700	5,100	2,800	2,400
California	81,000	59,100	21,900	88,800	63,100	25,700	94,100	65,600	28,600	101,900	69,000	32,900
Hawaii	3,900	2,800	1,100	4,300	3,000	1,300	4,600	3,200	1,400	5,000	3,400	1,600
Oregon	11,400	8,500	2,900	13,400	9,800	3,700	14,900	10,700	4,200	17,000	12,000	5,000
Washington	18,800	13,400	5,300	21,300	15,000	6,300	23,100	16,100	7,000	25,800	17,700	8,000

1/ The sum of the parts may not add to total due to rounding.

Source: Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Table 32.--Projected full-time equivalent registered nurses in each State and region by educational preparation (Series I), selected years 1977-1985

State and region	1977 Total 1/	1977 AD & Dip.	1977 Bacc. & above	1980 Total 1/	1980 AD & Dip.	1980 Bacc. & above	1982 Total 1/	1982 AD & Dip.	1982 Bacc. & above	1985 Total 1/	1985 AD & Dip.	1985 Bacc. & above
New England	71,000	56,900	14,000	79,700	61,300	18,400	85,200	63,900	21,400	93,300	67,100	26,200
Connecticut	16,200	13,000	3,200	18,200	14,000	4,200	19,500	14,600	5,000	21,400	15,300	6,100
Maine	4,700	4,100	500	5,200	4,500	700	5,500	4,700	800	6,000	5,000	1,000
Massachusetts	37,800	29,800	8,000	42,400	31,900	10,500	45,400	33,200	12,200	49,500	34,600	14,900
New Hampshire	4,600	3,900	700	5,100	4,300	900	5,500	4,500	1,000	6,100	4,900	1,200
Rhode Island	4,500	3,500	1,000	5,000	3,600	1,400	5,200	3,600	1,600	5,600	3,600	2,000
Vermont	3,200	2,600	6[illegible]	3,800	3,000	700	4,100	3,300	800	4,700	3,700	1,000
Middle Atlantic	182,200	141,500	41,000	201,000	148,900	52,000	213,300	152,800	60,500	230,400	156,800	73,500
New Jersey	31,900	25,200	6,800	35,900	27,600	8,300	38,700	29,200	9,500	42,800	31,200	11,500
New York	88,900	67,500	21,500	96,900	69,500	27,300	101,900	70,200	31,700	108,300	70,500	37,800
Pennsylvania	61,400	48,800	12,700	68,200	51,800	16,400	72,700	53,400	19,300	79,300	55,100	24,200
South Atlantic	131,700	106,200	25,700	159,500	125,200	34,200	178,300	137,900	40,400	205,400	155,300	49,600
Delaware	3,200	2,500	700	4,000	2,900	1,100	4,500	3,200	1,300	5,200	3,600	1,600
District of Columbia	5,500	3,500	2,000	6,100	3,700	2,400	6,500	3,800	2,800	7,100	3,900	3,200
Florida	31,900	27,500	4,400	37,600	32,400	5,200	41,500	35,700	5,700	47,100	40,500	6,600
Georgia	17,200	13,800	3,400	23,000	18,300	4,700	27,200	21,500	5,700	33,100	25,900	7,200
Maryland	17,600	12,900	4,700	20,900	14,700	6,100	23,100	16,000	7,100	26,500	17,900	8,600
North Carolina	20,000	16,200	3,900	24,100	18,600	5,500	26,700	20,000	6,700	30,400	22,000	8,400
South Carolina	9,500	7,800	1,800	11,700	9,200	2,500	13,100	10,100	3,000	15,100	11,300	3,800
Virginia	19,500	15,500	4,000	23,600	17,900	5,700	26,400	19,400	7,000	30,500	21,500	9,000
West Virginia	7,300	6,500	800	8,500	7,500	1,000	9,300	8,200	1,100	10,400	9,200	1,200
East South Central	39,200	31,900	7,300	47,600	37,200	10,400	53,200	40,600	12,700	60,900	44,900	16,000
Alabama	9,500	8,000	1,900	12,000	9,100	2,900	13,400	9,800	3,600	15,300	10,700	4,600
Kentucky	10,300	8,300	2,000	12,400	9,700	2,700	13,900	10,600	[illegible],300	15,900	11,800	4,100
Mississippi	6,900	5,700	1,200	8,800	6,900	1,900	10,000	7,700	2,400	11,700	8,600	3,100
Tennessee	12,100	9,900	2,200	14,400	11,500	2,900	15,900	12,500	3,400	18,000	13,800	4,200

Table 32.--Projected full-time equivalent registered nurses in each State and region by educational preparation (Series I), selected years 1977-1985--Continued

State and region	1977			1980			1982			1985		
	Total[1]	AD & Dip.	Bacc. & above	Total[1]	AD & Dip.	Bacc. & above	Total[1]	AD & Dip.	Bacc. & above	Total[1]	AD & Dip.	Bacc. & above
West South Central	60,200	44,600	15,600	75,300	54,000	21,400	85,600	59,800	25,800	100,400	68,000	32,300
Arkansas	5,100	4,300	800	6,400	5,500	900	7,300	6,300	1,000	8,600	7,400	1,200
Louisiana	10,800	7,800	2,900	13,200	9,400	3,800	14,900	10,500	4,400	17,300	12,000	5,300
Oklahoma	8,100	6,500	1,700	10,200	8,000	2,200	11,600	8,900	2,700	13,600	10,300	3,300
Texas	36,200	26,000	10,200	45,500	31,100	14,500	51,800	34,100	17,700	60,900	38,300	22,500
East North Central	163,100	129,600	33,400	183,500	140,700	42,600	197,100	147,600	49,600	216,000	155,500	60,300
Illinois	43,300	33,000	10,200	46,800	33,900	12,800	49,200	34,400	14,800	52,600	34,600	18,000
Indiana	16,800	13,200	3,600	19,000	14,500	4,500	20,400	15,300	5,100	22,200	16,200	6,000
Michigan	33,400	26,700	6,700	38,100	29,600	8,500	41,300	31,400	9,900	45,800	33,700	12,000
Ohio	50,500	42,500	8,000	56,800	46,700	10,100	60,900	49,300	11,700	66,700	52,300	14,300
Wisconsin	19,100	14,200	4,900	22,800	16,000	6,700	25,300	17,200	8,100	28,700	18,700	10,000
West North Central	70,200	55,400	14,800	79,500	60,800	18,800	85,700	64,400	21,400	93,800	68,500	25,400
Iowa	11,900	10,000	1,900	13,400	10,900	2,500	14,400	11,500	2,900	15,700	12,100	3,600
Kansas	9,600	7,500	2,100	10,800	8,200	2,600	11,700	8,700	3,000	12,900	9,200	3,700
Minnesota	19,400	14,800	4,700	22,000	16,300	5,700	23,700	17,300	6,400	25,900	18,500	7,400
Missouri	16,000	12,700	3,300	18,100	14,000	4,200	19,500	14,800	4,700	21,300	15,800	5,500
Nebraska	7,300	5,700	1,500	8,500	6,300	2,200	9,300	6,700	2,600	10,400	7,200	3,200
North Dakota	2,700	2,100	600	2,800	2,100	700	2,900	2,100	800	2,900	2,100	900
South Dakota	3,300	2,600	700	3,900	3,000	900	4,200	3,300	1,000	4,700	3,600	1,100
Mountain	42,000	30,400	11,700	50,400	35,500	15,000	56,000	38,700	17,400	64,200	43,300	21,000
Arizona	12,000	8,900	3,100	14,600	10,200	4,400	16,500	11,100	5,400	19,200	12,500	6,600
Colorado	13,600	9,200	4,300	15,700	10,200	5,600	17,100	10,700	6,400	19,100	11,400	7,700
Idaho	2,800	2,300	400	3,200	2,700	500	3,500	2,900	600	3,900	3,200	700
Montana	3,200	2,400	900	3,700	2,600	1,000	3,900	2,800	1,100	4,300	3,000	1,300
Nevada	2,400	1,800	600	3,600	2,900	800	4,400	3,500	900	5,600	4,500	1,100
New Mexico	3,000	2,300	800	3,900	3,000	900	4,500	3,500	1,100	5,300	4,100	1,200
Utah	3,500	2,400	1,200	4,000	2,700	1,300	4,300	2,900	1,400	4,800	3,200	1,600
Wyoming	1,500	1,100	400	1,700	1,200	500	1,800	1,300	500	2,000	1,400	600
Pacific	99,900	71,800	28,200	111,300	78,000	33,300	119,100	81,800	37,300	130,600	87,300	43,300
Alaska	2,100	1,400	600	2,900	1,700	1,200	3,400	1,900	1,500	4,400	2,300	2,100
California	69,400	50,100	19,300	76,000	53,400	22,600	80,400	55,400	25,100	86,800	58,000	28,800
Hawaii	3,600	2,500	1,100	4,000	2,800	1,200	4,200	2,900	1,300	4,600	3,100	1,500
Oregon	9,300	6,900	2,400	10,900	7,900	3,000	12,100	8,600	3,500	13,700	9,600	4,100
Washington	15,500	10,900	4,600	17,500	12,200	5,300	19,000	13,000	5,900	21,100	14,300	6,800

[1] The sum of the parts may not equal the total due to roundings.

Source: Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Table 33.--Projected active supply of registered nurses in each State and region (Series II), selected years 1977-1985.

State and region	1977				1980				1982				1985			
	Total RNs		FTE RNs		Total RNs		FTE RNs		Total RNs		FTE RNs		Total RNs		FTE RNs	
	Number	RNs per 100,000 pop.	Number	RNs per 100,000 pop.	Number	RNs per 100,000 pop.	Number	RNs per 100,000 pop.	Number	RNs per 100,000 pop.	Number	RNs per 100,000 pop.	Number	RNs per 100,000 pop.	Number	RNs per 100,000 pop.
New England	90,000	727	71,000	574	100,800	796	79,700	629	108,400	841	85,400	663	120,000	907	94,500	714
Connecticut	21,100	666	16,200	511	23,700	729	18,200	681	25,500	774	19,600	707	28,400	836	21,700	738
Maine	5,900	561	4,700	450	6,500	611	5,200	488	7,000	639	5,500	505	7,600	6[illegible]	6,100	545
Massachusetts	47,800	809	37,800	640	53,500	889	42,400	704	57,400	939	45,500	744	63,500	1,016	50,200	803
New Hampshire	5,600	683	4,600	561	6,300	730	5,100	592	6,800	764	5,500	619	7,600	810	6,100	654
Rhode Island	5,700	593	4,500	468	6,200	637	5,000	512	6,600	662	5,200	525	7,100	701	5,700	564
Vermont	3,900	81[illegible]	3,200	669	4,600	931	3,800	769	5,100	1,005	4,100	812	5,800	1,116	4,700	899
Middle Atlantic	221,500	584	182,200	480	244,100	636	201,000	524	259,700	669	213,600	550	284,200	721	233,800	593
New Jersey	40,500	540	31,900	425	45,600	592	35,900	465	49,300	629	38,700	494	55,300	684	43,300	536
New York	106,300	576	88,900	481	115,700	622	96,900	751	122,000	649	102,100	543	131,500	691	110,200	579
Pennsylvania	74,700	624	61,400	513	82,800	688	68,200	567	88,400	726	72,800	598	97,400	792	80,300	653
South Atlantic	152,100	455	131,700	394	184,300	527	159,500	457	206,800	575	178,700	496	241,500	643	208,600	553
Delaware	3,900	669	3,200	547	4,800	793	4,000	659	5,400	878	4,500	726	6,400	995	5,300	824
District of Columbia	6,200	854	5,500	763	6,900	977	6,100	867	7,400	1,045	6,600	936	8,100	1,172	7,200	1,039
Florida	36,600	449	31,900	391	43,200	487	37,600	424	47,900	515	41,500	446	55,000	549	47,700	476
Georgia	19,100	387	17,200	347	25,700	500	23,000	448	30,400	576	27,200	515	37,900	692	33,900	618
Maryland	21,300	508	17,600	420	25,300	579	20,900	479	28,100	631	23,200	520	32,600	701	26,800	577
North Carolina	22,800	424	20,000	372	27,400	496	24,100	436	30,500	539	26,800	473	35,200	602	30,900	529
South Carolina	10,700	389	9,500	344	13,200	462	11,700	411	14,800	506	13,100	448	17,300	572	15,300	506
Virginia	23,200	471	19,500	396	28,000	550	23,600	463	31,500	603	26,500	508	36,800	680	30,900	571
West Virginia	8,300	468	7,300	409	9,800	549	8,500	477	10,800	595	9,300	513	12,200	670	10,600	581
East South Central	44,000	327	39,200	291	53,600	390	47,600	347	60,000	428	53,400	381	69,700	485	61,900	431
Alabama	11,000	307	9,900	276	13,400	367	12,000	329	15,000	404	13,500	363	17,400	458	15,600	410
Kentucky	11,900	352	10,300	306	14,400	418	12,400	361	16,100	459	[illegible],900	396	18,700	521	16,100	448
Mississippi	7,500	325	6,900	298	9,600	405	8,800	373	10,900	454	10,000	416	13,000	528	11,900	484
Tennessee	13,600	326	12,100	290	16,200	378	14,400	336	18,000	411	16,000	366	20,600	458	18,300	406

Table 33.--Projected active supply of registered nurses in each State and region (Series II), selected years 1977-1985--Continued

State and region	1977				1980				1982				1985			
	Total RNs		FTE RNs		Total RNs		FTE RNs		Total RNs		FTE RNs		Total RNs		FTE RNs	
	Number	RNs per 100,000 pop.1/	Number	RNs per 100,000 pop.1/	Number	RNs per 100,000 pop.1/	Number	RNs per 100,000 pop.1/	Number	RNs per 100,000 pop.1/	Number	RNs per 100,000 pop.1/	Number	RNs per 100,000 pop.1/	Number	RNs per 100,000 pop.1/
West South Central	67,500	325	60,200	290	84,500	393	75,300	350	96,500	438	85,900	390	114,500	501	101,800	445
Arkansas	5,700	277	5,100	246	7,200	340	6,400	300	8,300	381	7,300	334	10,000	440	8,700	450
Louisiana	12,200	320	10,800	284	15,000	384	13,200	339	17,000	427	15,000	378	19,900	490	17,600	433
Oklahoma	9,200	336	8,100	297	11,500	410	10,200	363	13,200	458	11,700	407	15,600	526	13,800	465
Texas	40,400	332	36,200	298	50,800	401	45,500	359	58,000	446	51,900	399	69,000	509	61,700	455
East North Central	190,800	458	163,100	391	214,900	507	183,500	433	231,700	539	197,600	459	257,400	586	219,200	499
Illinois	52,000	457	43,300	381	56,100	488	46,800	407	59,200	508	49,300	423	64,100	541	53,400	451
Indiana	20,400	376	16,800	310	23,100	417	19,000	343	24,900	442	20,500	364	27,600	478	22,600	392
Michigan	41,200	444	33,400	360	47,200	496	[illegible]	401	51,300	531	41,400	429	57,600	582	46,400	468
Ohio	52,600	481	50,500	461	59,200	533	56,800	512	63,700	566	61,100	543	70,500	616	67,600	590
Wisconsin	24,600	509	19,100	411	29,300	615	22,800	479	32,600	673	25,300	522	37,600	754	29,200	586
West North Central	86,400	512	70,200	416	98,200	574	79,500	464	105,900	609	86,000	495	118,200	667	95,500	539
Iowa	14,800	514	11,900	412	16,800	577	13,400	462	18,000	614	14,400	490	20,000	671	15,900	535
Kansas	11,300	494	9,600	420	12,800	557	10,800	473	13,900	595	11,700	501	15,500	657	13,100	554
Minnesota	24,800	621	19,400	486	28,100	688	22,000	539	30,300	732	23,800	573	33,900	795	26,400	620
Missouri	19,100	393	16,000	330	21,600	438	18,100	367	23,300	465	19,500	390	25,900	506	21,700	424
Nebraska	8,900	577	7,300	470	10,500	662	8,500	537	11,500	714	9,400	583	13,100	793	10,600	642
North Dakota	3,300	531	2,700	429	3,500	545	2,800	442	3,500	549	2,900	450	3,700	565	3,000	460
South Dakota	4,200	613	3,300	485	4,900	715	3,900	569	5,400	771	4,300	618	6,100	860	4,800	682
Mountain	47,800	505	42,000	444	57,400	571	50,500	501	64,000	613	56,000	536	73,900	668	65,100	588
Arizona	12,400	572	12,000	553	15,100	635	14,600	616	17,000	681	16,500	562	20,100	742	19,500	722
Colorado	15,800	631	13,600	542	18,400	688	15,800	587	20,000	722	17,100	617	22,400	763	19,200	653
Idaho	3,400	423	2,800	352	3,900	467	3,200	384	4,300	497	3,500	406	4,900	542	4,000	443
Montana	4,100	554	3,200	435	4,600	611	3,700	492	5,000	645	3,900	507	5,500	699	4,400	557
Nevada	2,700	462	2,400	408	4,100	631	3,600	559	5,000	742	4,400	655	6,400	884	5,700	783
New Mexico	3,400	307	3,000	268	4,500	384	3,900	334	5,200	432	4,500	373	6,200	494	5,400	429
Utah	4,200	355	3,500	295	4,800	385	4,000	320	5,300	407	4,300	333	6,000	440	4,900	361
Wyoming	1,800	509	1,500	419	2,000	551	1,700	462	2,200	575	1,800	476	2,400	618	2,000	512
Pacific	117,500	414	99,900	352	131,100	444	111,300	377	140,900	467	119,300	395	156,800	498	132,400	421
Alaska	2,500	745	2,100	634	3,300	938	2,900	822	4,000	1,084	3,400	1,010	5,200	1,324	4,400	1,128
California	81,000	379	69,400	325	88,800	399	76,000	341	94,300	414	80,600	354	103,100	435	87,900	371
Hawaii	3,900	469	3,600	433	4,300	494	4,000	459	4,600	511	4,200	467	5,100	540	4,700	499
Oregon	11,400	494	9,300	404	13,400	559	10,900	453	14,900	605	12,100	490	17,300	672	14,000	542
Washington	18,700	528	15,500	437	21,300	584	17,500	480	23,100	624	19,000	512	26,100	683	21,400	560

1/ State population estimates projected by Vector Research, Inc.
Source: Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.
Note: FTE = full-time equivalent.

Table 34.--Projected active supply of registered nurses in each State and region by educational preparation (Series II). selected years 1977-1985

State and region	1977			1980			1982			1985		
	Total 1/	AD & Dip.	Bacc. & above	Total 1/	AD & Dip.	Bacc. & above	Total 1/	AD & Dip.	Bacc. & above	Total 1/	AD & Dip.	Bacc. & above
New England	90,000	73,400	16,500	100,800	79,300	21,600	108,400	83,100	25,400	120,000	88,100	32,100
Connecticut	21,100	17,200	3,900	23,700	18,600	5,100	25,500	19,500	6,100	28,400	20,700	7,700
Maine	5,900	5,200	600	6,500	5,700	800	7,000	6,000	1,000	7,600	6,400	1,300
Massachusetts	47,800	38,500	9,300	53,500	41,400	12,200	57,400	43,200	14,200	63,500	45,500	18,000
New Hampshire	5,600	4,800	800	6,300	5,300	1,000	6,800	5,600	1,200	7,600	6,100	1,500
Rhode Island	5,700	4,500	1,200	6,200	4,600	1,600	6,600	4,700	1,900	7,100	4,700	2,400
Vermont	3,900	3,200	700	4,600	3,700	900	5,100	4,100	1,000	5,800	4,700	1,200
Middle Atlantic	221,500	175,500	46,100	244,100	185,400	58,700	259,700	191,000	68,700	284,200	198,200	85,900
New Jersey	40,500	32,500	8,000	45,600	35,800	9,800	49,300	38,000	11,300	55,300	41,200	14,000
New York	106,300	82,400	24,000	115,700	85,100	30,600	122,000	86,200	35,800	131,500	87,400	44,100
Pennsylvania	74,700	60,600	14,100	82,800	64,500	18,300	88,400	66,800	21,600	97,400	69,600	27,800
South Atlantic	152,100	123,800	28,500	184,300	146,100	38,200	206,800	161,400	45,600	241,500	183,800	57,700
Delaware	3,900	3,100	800	4,800	3,600	1,200	5,400	4,000	1,500	6,400	4,500	1,900
District of Columbia	6,200	4,000	2,200	6,900	4,200	2,700	7,400	4,300	3,100	8,100	4,400	3,700
Florida	36,600	31,700	4,900	43,200	37,400	5,800	47,900	41,400	6,500	55,000	47,400	7,700
Georgia	19,100	15,500	3,600	25,700	20,600	5,100	30,400	24,300	6,100	37,900	29,800	8,100
Maryland	21,300	15,900	5,400	25,300	18,200	7,100	28,100	19,900	8,300	32,600	22,300	10,300
North Carolina	22,800	18,500	4,300	27,400	21,300	6,100	30,500	23,000	7,500	35,200	25,400	9,700
South Carolina	10,700	8,900	1,900	13,200	10,500	2,700	14,800	11,500	3,300	17,300	13,000	4,300
Virginia	23,200	18,700	4,500	28,000	21,600	6,400	31,500	23,500	8,000	36,800	26,200	10,600
West Virginia	8,300	7,500	900	9,800	8,700	1,100	10,800	9,500	1,200	12,200	10,800	1,400
East South Central	44,000	36,200	7,900	53,600	42,300	11,300	60,000	46,100	13,900	69,700	51,600	18,200
Alabama	11,000	9,000	2,000	13,400	10,300	3,100	15,000	11,100	3,900	17,400	12,200	5,200
Kentucky	11,900	9,700	2,200	14,400	11,400	3,000	16,100	12,400	3,700	18,700	14,000	4,700
Mississippi	7,500	6,300	1,300	9,600	7,600	2,000	10,900	8,400	2,500	13,000	9,500	3,500
Tennessee	13,600	11,200	2,400	16,200	13,000	3,200	18,000	14,200	3,800	20,600	15,900	4,800

Table 34.—Projected active supply of registered nurses in each State and region by educational preparation (Series II), selected years 1977-1985—Continued

State and region	1977			1980			1982			1985		
	Total 1/	AD & Dip.	Bacc. above	Total 1/	AD & Dip.	Bacc. above	Total 1/	AD & Dip.	Bacc. above	Total 1/	AD & Dip.	Bacc. above
West South Central	67,500	50,400	17,000	84,500	61,000	23,500	96,500	68,000	28,500	114,500	77,700	36,700
Arkansas	5,700	4,900	800	7,200	6,200	1,000	8,300	7,200	1,100	10,000	8,600	1,300
Louisiana	12,200	9,000	3,200	15,000	10,800	4,200	17,000	12,100	4,900	19,900	13,900	6,000
Oklahoma	9,200	7,300	1,800	11,500	9,000	2,500	13,200	10,200	3,000	15,600	11,800	3,800
Texas	40,400	29,200	11,200	50,800	35,000	15,800	58,000	38,500	19,500	69,000	43,400	25,600
East North Central	190,800	153,300	37,400	214,900	166,800	48,100	231,700	175,300	56,300	257,400	186,900	70,600
Illinois	52,000	40,400	11,500	56,100	41,700	14,500	59,200	42,400	16,800	64,100	43,200	21,000
Indiana	20,400	16,300	4,100	23,100	17,900	5,200	24,900	19,000	5,900	27,600	20,400	7,200
Michigan	41,200	33,400	7,800	47,200	37,100	10,000	51,300	39,500	11,700	57,600	42,900	14,700
Ohio	52,600	44,400	8,200	59,200	48,800	10,400	63,700	51,500	12,200	70,500	55,200	15,400
Wisconsin	24,600	18,800	5,800	29,300	21,300	8,000	32,600	22,900	9,700	37,600	25,200	12,300
West North Central	86,400	68,900	17,300	98,200	76,000	22,100	106,000	80,500	25,500	118,200	86,600	31,400
Iowa	14,800	12,500	2,300	16,800	13,800	3,000	18,000	14,500	3,500	20,000	15,500	4,500
Kansas	11,300	8,900	2,300	12,800	9,800	3,000	13,900	10,400	3,500	15,500	11,100	4,400
Minnesota	24,800	19,200	5,600	28,100	21,200	6,900	30,400	22,600	7,800	33,900	24,500	9,300
Missouri	19,100	15,200	3,800	21,600	16,800	4,800	23,300	17,800	5,500	25,900	19,200	6,600
Nebraska	8,900	7,200	1,800	10,500	7,900	2,600	11,500	8,400	3,100	13,100	9,000	4,100
North Dakota	3,300	2,600	700	3,500	2,600	800	3,500	2,600	900	3,700	2,600	1,100
South Dakota	4,200	3,300	800	4,900	3,900	1,000	5,400	4,200	1,200	6,100	4,700	1,400
Mountain	47,800	35,100	12,900	57,400	40,900	16,500	64,000	44,600	19,300	73,900	50,300	23,600
Arizona	12,400	9,200	3,200	15,100	10,600	4,500	17,000	11,500	5,500	20,100	12,900	7,100
Colorado	15,800	11,000	4,800	18,400	12,200	6,200	20,000	12,800	7,200	22,400	13,800	8,700
Idaho	3,400	2,900	500	3,900	3,300	600	4,300	3,600	700	4,900	4,000	900
Montana	4,100	3,000	1,000	4,600	3,400	1,200	5,000	3,600	1,400	5,500	3,900	1,600
Nevada	2,700	2,100	700	4,100	3,200	900	5,000	4,000	1,000	6,400	5,200	1,200
New Mexico	3,400	2,600	800	4,500	3,400	1,000	5,200	4,000	1,200	6,200	4,800	1,400
Utah	4,200	2,900	1,400	4,800	3,300	1,600	5,300	3,500	1,700	6,000	4,000	2,000
Wyoming	1,800	1,400	500	2,000	1,500	500	2,200	1,600	600	2,400	1,700	700
Pacific	117,600	85,400	32,100	131,200	92,900	38,300	140,900	97,900	43,000	156,800	105,500	51,200
Alaska	2,500	1,600	900	3,300	2,000	1,300	4,000	2,300	1,700	5,200	2,800	2,400
California	81,000	59,100	21,900	88,800	63,100	25,700	94,300	65,600	28,700	103,100	69,400	33,700
Hawaii	3,900	2,800	1,100	4,300	3,000	1,300	4,600	3,200	1,400	5,100	3,400	1,700
Oregon	11,400	8,500	2,900	13,400	9,800	3,700	14,900	10,700	4,200	17,300	12,100	5,200
Washington	18,800	13,400	5,300	21,300	15,000	6,300	23,100	16,100	7,000	26,100	17,800	8,200

1/ The sum of the parts may not equal the total due to rounding.

Source: Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.

Table 35.--Projected full-time equivalent registered nurses in each State and region by educational preparation (Series II), selected years 1977-1985

State and region	1977			1980			1982			1985		
	Total1/	AD & Dip.	Bacc. & above	Total1/	AD & Dip.	Bacc. & above	Total1/	AD & Dip.	Bacc. & above	Total1/	AD & Dip.	Bacc. & above
New England	71,000	56,900	14,000	79,700	61,300	18,400	85,400	63,900	21,500	94,500	67,500	27,000
Connecticut	16,200	13,000	3,200	18,200	14,000	4,200	19,600	14,600	5,000	21,700	15,400	6,300
Maine	4,700	4,100	500	5,200	4,500	700	5,500	4,700	800	6,100	5,000	1,100
Massachusetts	37,800	29,800	8,000	42,400	31,900	10,500	45,500	33,200	12,300	50,200	34,800	15,400
New Hampshire	4,600	3,900	700	5,100	4,300	900	5,500	4,500	1,000	6,100	4,900	1,200
Rhode Island	4,500	3,500	1,000	5,000	3,600	1,400	5,200	3,600	1,600	5,700	3,600	2,000
Vermont	3,200	2,600	600	3,800	3,000	700	4,100	3,300	800	4,700	3,800	1,000
Middle Atlantic	182,200	141,500	41,000	201,000	148,900	52,000	213,600	152,900	60,800	233,800	157,900	75,900
New Jersey	31,900	25,200	6,800	35,900	27,600	8,300	38,700	29,200	9,500	43,300	31,500	11,800
New York	88,900	67,500	21,500	96,900	69,500	27,300	102,100	70,200	31,900	110,200	70,900	39,300
Pennsylvania	61,400	48,800	12,700	68,200	51,800	16,400	72,800	53,500	19,400	80,300	55,500	24,800
South Atlantic	131,700	106,200	25,700	159,500	125,200	34,200	178,700	138,000	40,700	208,600	156,900	51,700
Delaware	3,200	2,500	700	4,000	2,900	1,100	4,500	3,200	1,300	5,300	3,600	1,700
District of Columbia	5,500	3,500	2,000	6,100	3,700	2,400	6,600	3,800	2,800	7,200	3,900	3,400
Florida	31,900	27,500	4,400	37,600	32,400	5,200	41,500	35,800	5,800	47,700	40,800	6,800
Georgia	17,200	13,800	3,400	23,000	18,300	4,700	27,200	21,500	5,700	33,900	26,400	7,500
Maryland	17,600	12,900	4,700	20,900	14,700	6,100	23,200	16,000	7,200	26,800	17,900	8,900
North Carolina	20,000	16,200	3,900	24,100	18,600	5,500	26,800	20,000	6,800	30,900	22,100	8,800
South Carolina	9,500	7,800	1,800	11,700	9,200	2,500	13,100	10,100	3,000	15,300	11,300	4,000
Virginia	19,500	15,500	4,000	23,600	17,900	5,700	26,500	19,400	7,000	30,900	21,600	9,300
West Virginia	7,300	6,500	800	8,500	7,500	1,000	9,300	8,200	1,100	10,600	9,300	1,300
East South Central	39,200	31,900	7,300	47,600	37,200	10,400	53,400	40,600	12,800	61,900	45,400	16,500
Alabama	9,900	8,000	1,900	12,000	9,100	2,900	13,500	9,800	3,600	15,600	10,800	4,800
Kentucky	10,300	8,300	2,000	12,400	9,700	2,700	13,900	10,600	3,300	16,100	11,900	4,200
Mississippi	6,900	5,700	1,200	8,800	6,900	1,900	10,000	7,700	2,400	11,900	8,700	3,200
Tennessee	12,100	9,900	2,200	14,400	11,500	2,900	16,000	12,500	3,500	18,300	14,000	4,300

Table 35.—Projected full-time equivalent registered nurses in each State and region by educational preparation (Series II), selected years 1977-1985—Continued

State and region	1977 Total1/	1977 AD & Dip.	1977 Bacc. & above	1980 Total1/	1980 AD & Dip.	1980 Bacc. & above	1982 Total1/	1982 AD & Dip.	1982 Bacc. & above	1985 Total1/	1985 AD & Dip.	1985 Bacc. & above
West South Central	60,200	44,600	15,600	75,300	54,000	21,400	85,900	59,900	26,000	101,800	68,400	33,400
Arkansas	5,100	4,300	800	6,400	5,500	900	7,300	6,300	1,000	8,700	7,500	1,200
Louisiana	10,800	7,800	2,900	13,200	9,400	3,800	15,000	10,500	4,500	17,600	12,100	5,500
Oklahoma	8,100	6,500	1,700	10,200	8,000	2,200	11,700	9,000	2,700	13,800	10,400	3,400
Texas	36,200	26,000	10,200	45,500	31,100	14,500	51,900	34,100	17,800	61,700	38,400	23,300
East North Central	163,100	129,600	33,400	183,500	140,700	42,600	197,600	147,600	49,900	219,200	156,900	62,300
Illinois	43,300	33,000	10,200	46,800	33,900	12,800	49,300	34,400	14,800	53,400	35,000	18,500
Indiana	16,800	13,200	3,600	19,000	14,500	4,500	20,500	15,300	5,200	22,600	16,400	6,200
Michigan	33,400	26,700	6,700	38,100	29,600	8,500	41,400	31,400	10,000	46,400	34,000	12,400
Ohio	50,500	42,500	8,000	56,800	46,700	10,100	61,100	49,300	11,800	67,600	52,700	14,800
Wisconsin	19,100	14,200	4,900	22,800	16,000	6,700	25,300	17,200	8,100	29,200	18,800	10,400
West North Central	70,200	55,400	14,800	79,500	60,800	18,800	86,000	64,400	21,700	95,500	69,100	26,400
Iowa	11,900	10,000	1,900	13,400	10,900	2,500	14,400	11,500	2,900	15,900	12,200	3,700
Kansas	9,600	7,500	2,100	10,800	8,200	2,600	11,700	8,700	3,100	13,100	9,300	3,900
Minnesota	19,400	14,800	4,700	22,000	16,300	5,700	23,800	17,300	6,500	26,400	18,700	7,700
Missouri	16,000	12,700	3,300	18,100	14,000	4,200	19,500	14,800	4,700	21,700	16,000	5,700
Nebraska	7,300	5,700	1,500	8,500	6,300	2,200	9,400	6,700	2,700	10,600	7,200	3,400
North Dakota	2,700	2,100	600	2,800	2,100	700	2,900	2,100	800	3,000	2,100	900
South Dakota	3,300	2,600	700	3,900	3,000	900	4,300	3,300	1,000	4,800	3,600	1,100
Mountain	42,000	30,400	11,700	50,500	35,500	15,000	56,000	38,800	17,400	65,100	43,400	21,400
Arizona	12,000	8,900	3,100	14,600	10,200	4,400	16,500	11,100	5,400	19,500	12,500	7,000
Colorado	13,600	9,200	4,300	15,800	10,200	5,600	17,100	10,700	6,400	19,200	11,400	7,700
Idaho	2,800	2,300	400	3,200	2,700	500	3,500	2,900	600	4,000	3,200	700
Montana	3,200	2,400	900	3,700	2,800	1,000	3,900	2,800	1,100	4,400	3,000	1,300
Nevada	2,400	1,800	600	3,600	2,900	800	4,400	3,600	900	5,700	4,600	1,100
New Mexico	3,000	2,300	800	3,900	3,000	900	4,500	3,500	1,100	5,400	4,100	1,300
Utah	3,500	2,400	1,200	4,000	2,700	1,300	4,300	2,900	1,400	4,900	3,200	1,700
Wyoming	1,500	1,100	400	1,700	1,200	500	1,800	1,300	500	2,000	1,400	600
Pacific	99,900	71,800	28,200	111,300	78,000	33,300	119,300	81,900	37,400	132,400	88,000	44,300
Alaska	2,100	1,400	800	2,900	1,700	1,200	3,400	1,900	1,500	4,400	2,300	2,100
California	69,400	50,100	19,300	76,000	53,400	22,600	80,600	55,400	25,100	87,900	58,400	29,500
Hawaii	3,600	2,500	1,100	4,000	2,800	1,200	4,200	2,900	1,300	4,700	3,100	1,500
Oregon	9,300	6,900	2,400	10,900	7,900	3,000	12,100	8,600	3,500	14,000	9,800	4,200
Washington	15,500	10,900	4,600	17,500	12,200	5,300	19,000	13,100	6,000	21,400	14,400	7,000

1/ The sum of the parts may not equal the total due to rounding.

Source: Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health Education and Welfare, 1977

Table 36.--Projected active supply of licensed practical nurses in each State and region (Series I), selected years 1977-1985

State and region	1977				1980				1982				1985			
	Total LPNs		FTE LPNs		Total LPNs		FTE LPNs		Total LPNs		FTE LPNs		Total LPNs		FTE LPNs	
	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/
New England	29,800	241	24,600	199	31,700	250	26,300	208	33,100	257	27,200	211	34,700	262	28,500	215
Connecticut	6,700	212	5,500	174	7,400	228	6,100	187	7,800	237	6,400	194	8,400	247	6,900	202
Maine	2,200	215	1,800	176	2,500	236	2,100	193	2,700	246	2,200	201	2,900	260	2,400	212
Massachusetts	15,000	253	12,400	210	15,300	255	12,700	211	15,600	255	12,900	211	15,900	254	13,100	210
New Hampshire	1,800	222	1,500	184	2,000	236	1,700	195	2,200	244	1,800	201	2,400	253	1,900	209
Rhode Island	2,600	267	2,100	215	2 800	288	2,300	232	3,000	300	2,400	241	3,200	315	2,600	253
Vermont	1,500	319	1,300	268	1,700	343	1,400	287	1,800	356	1,500	297	1,900	369	1,600	309
Middle Atlantic	88,500	233	76,400	201	99,000	258	85,100	222	106,100	273	90,900	234	115,900	294	99,700	253
New Jersey	20,400	272	17,400	232	25,900	336	22,100	286	30,000	380	25,300	323	35,800	444	30,500	378
New York	43,100	234	37,000	200	48,500	261	41,500	223	51,800	275	44,300	236	56,100	295	48,100	253
Pennsylvania	25,000	209	22,000	183	24,600	204	21,500	179	24,300	200	21,300	175	24,000	196	21,100	171
South Atlantic	73,100	218	65,500	196	86,400	247	77,300	221	95,500	265	85,000	236	108,900	290	97,500	259
Delaware	1,000	172	900	149	1,100	183	1,000	158	1,200	190	1,000	164	1,300	197	1,100	170
District of Columbia	2,400	329	2,200	304	2,300	332	2,200	306	2,300	329	2 100	303	2,300	332	2,100	306
Florida	16,700	205	14,700	180	19,700	223	17,300	195	21,700	233	19,000	204	24,500	[illegible]	21,500	214
Georgia	15,300	309	14,100	285	19,900	387	18,400	357	23,200	441	21,400	407	28,700	524	26,500	483
Maryland	6,200	148	5,500	132	7,100	163	6,300	145	7,700	173	6,800	153	8,600	184	7,600	164
North Carolina	10,800	201	9,300	173	12,300	222	10,500	190	13,200	232	11.300	203	14,400	247	12,400	212
South Carolina	6,000	218	5,500	199	7,200	252	6,500	230	8,000	272	7,200	247	9,100	300	8,300	273
Virginia	10,800	220	9,700	197	12,500	246	11,200	220	13,700	227	12.200	234	15,300	283	13,700	253
West Virgina	3,900	221	3,600	201	4,300	239	3,900	217	4,500	246	4,000	223	4,700	259	4,300	235
East South Central	35,300	262	32 600	242	39,800	290	36,700	267	42,700	305	39,400	281	47,000	327	43,300	302
Alabama	9,700	271	9,100	253	10,700	293	10,000	274	11,300	303	10,600	283	12,100	317	11,300	297
Kentucky	6,200	183	5,700	168	6,900	202	6,400	185	7,400	212	6,800	194	8,100	226	7,400	206
Mississippi	4,700	204	4,300	186	5,100	217	4,700	198	5,300	220	4,800	200	5,500	223	5,000	203
Tennessee	14,700	352	13,500	323	17,100	399	15,600	365	18,700	429	17,200	392	21,300	474	19,600	434

Table 36.--Projected active supply of licensed practical nurses in each State and region (Series I), selected years 1977-1985--Continued

State and region	1977				1980				1982				1985			
	Total LPNs		FTE LPNs		Total LPNs		FTE LPNs		Total LPNs		FTE LPNs		Total LPNs		FTE LPNs	
	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/	Number	LPNs per 100,000 pop.1/
West South Central	59,100	285	53,900	260	66,700	310	60,800	283	71,700	325	65,100	295	78,700	344	71,700	314
Arkansas	5,900	284	5,300	257	6,800	321	6,200	290	7,500	341	6,700	308	8,400	370	7,600	334
Louisiana	9,100	240	8,000	211	10,700	275	9,400	241	11,800	297	10,300	260	13,300	328	11,700	287
Oklahoma	6,700	246	6,200	226	8,000	284	7,300	261	8,800	307	8,100	282	10,100	340	9,300	312
Texas	37,400	308	34,400	283	41,200	326	37,900	299	43,600	335	40,000	308	46,900	346	[illegible]	318
East North Central	82,100	197	70,200	168	90,000	212	76,700	181	94,900	221	80,900	188	102,100	232	87,000	198
Illinois	15,100	133	13,200	116	15,000	131	13,100	114	15,000	129	13,100	113	15,100	128	13,200	112
Indiana	8,500	157	7,300	135	10,100	182	8,700	156	11,000	196	9,500	169	12,400	215	10,700	192
Michigan	21,600	233	18,300	197	24,400	257	20,600	216	26,200	271	22,100	229	28,900	291	24,400	246
Ohio	27,200	248	23,500	215	29,200	263	25,200	227	30,400	271	26,300	234	32,000	280	27,700	242
Wisconsin	9,700	209	7,900	170	11,300	237	9,100	191	12,300	253	9,900	204	13,700	274	11,000	222
West North Central	39,500	234	33,800	200	45,300	265	38,400	224	48,800	281	41,500	239	53,800	304	45,800	258
Iowa	6,800	237	5,800	200	8,000	276	6,700	232	8,700	297	7,300	250	9,700	326	8,200	275
Kansas	4,000	174	3,600	158	4,500	197	4,100	179	4,900	209	4,400	190	5,400	227	4,900	206
Minnesota	11,000	277	8,900	222	12,600	310	10,100	247	13,500	326	10,800	260	14,700	345	11,700	276
Missouri	10,700	221	9,500	196	12,000	243	10,600	215	12,800	256	11,300	226	14,100	275	12,400	243
Nebraska	3,900	249	3,400	217	4,800	301	4,100	262	5,400	332	4,700	289	6,200	378	5,400	329
North Dakota	1,700	263	1,400	223	1,800	281	1,500	238	1,800	286	1,600	242	1,900	247	1,600	249
South Dakota	1,400	202	1,200	173	1,600	227	1,300	195	1,700	240	1,400	206	1,800	259	1,600	222
Mountain	20,000	211	17,500	185	23,100	230	20,000	199	25,200	241	21,900	210	28,200	255	24,500	221
Arizona	4,000	184	3,500	162	4,700	198	4,100	174	5,200	207	4,500	182	5,900	217	5,200	191
Colorado	5,200	206	4,500	179	5,700	212	4,900	183	6,000	215	5,200	186	6,400	217	5,500	188
Idaho	2,400	299	2,100	260	2,700	325	2,300	282	2,900	340	2,500	294	3,300	362	2,800	314
Montana	1,600	212	1,400	188	1,700	222	1,500	197	1,700	225	1,500	200	1,800	230	1,600	204
Nevada	1,300	219	1,200	201	1,400	223	1,300	204	1,500	228	1,400	208	1,700	229	1,500	209
New Mexico	2,300	206	2,100	184	2,800	242	2,500	215	3,200	262	2,800	233	3,600	289	3,200	257
Utah	2,600	223	2,200	189	3,400	270	2,800	228	3,900	300	3,300	253	4,600	340	3,900	287
Wyoming	600	170	500	148	700	194	600	169	800	206	700	179	900	222	800	194
Pacific	63,300	223	56,000	197	77,000	261	68,000	230	86,500	286	76,400	253	101,200	322	89,400	284
Alaska	500	152	400	135	600	173	500	152	700	186	600	164	800	204	700	181
California	49,800	233	44,200	207	62,200	279	55,000	247	70,800	311	62,600	275	84,300	355	74,600	315
Hawaii	2,000	243	1,900	232	2,400	273	2,300	260	[illegible]	292	2,500	278	3,000	317	2,800	302
Oregon	3,600	155	3,100	134	3,800	160	3,300	137	4,000	162	3,400	139	4,200	163	3,600	140
Washington	7,400	208	6,400	180	8,000	221	6,900	190	8,400	227	7,300	196	8,900	234	7,700	202

1/ State population estimates projected by Vector Research, Inc.
Source: Estimates prepared by the Division of Nursing, Health Resources Administration, Department of Health, Education, and Welfare, 1977
Note: FTE = full-time equivalent.

Table 37.--Projected active supply of licensed practical nurses in each State and region (Series II), selected years 1977-1985

State and region	1977				1980				1982				1985			
	Total LPNs		FTE LPNs		Total LPNs		FTE LPNs		Total LPNs		FTE LPNs		Total LPNs		FTE LPNs	
	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/
New England	29,800	241	24,600	199	31,500	249	25,900	204	32,500	252	26,900	209	34,000	257	28,000	212
Connecticut	6,700	212	5,500	174	7,400	226	6,000	185	7,700	235	6,300	192	8,300	243	6,800	199
Maine	2,200	215	1,800	176	2,500	234	2,000	191	2,700	243	2,200	198	2,900	256	2,300	209
Massachusetts	15,000	253	12,400	210	15,200	253	12,600	209	15,300	252	12,800	209	15,700	251	13,000	208
New Hampshire	1,800	222	1,500	184	2,000	235	1,700	194	2,100	242	1,800	200	2,300	250	1,900	206
Rhode Island	2,600	267	2,100	215	2,700	277	2,200	223	2,800	283	2,300	228	2,900	290	2,400	234
Vermont	1,500	319	1,300	268	1,700	340	1,400	285	1,800	351	1,500	294	[illegible],900	364	1,[illegible]00	305
Middle Atlantic	88,500	233	76,400	201	97,100	253	83,500	218	103,100	266	88,600	228	112,400	285	96,600	245
New Jersey	20,400	272	17,400	232	25,300	328	21,500	279	28,800	367	24,500	313	34,400	426	29,300	363
New York	43,100	233	37,000	200	48,000	258	41,100	221	5[illegible],000	271	43,700	232	55,200	290	47,300	248
Pennsylvania	25,000	209	22,000	183	23,800	198	20,900	174	23,300	191	20,400	168	22,800	185	20,000	162
South Atlantic	73,100	218	65,500	196	84,200	241	75,300	215	92,100	256	82,500	229	104,500	276	93,500	249
Delaware	1,000	171	900	149	1,100	182	1,000	157	1,200	188	1,000	162	1,200	194	1,100	168
District of Columbia	2,400	329	2,200	304	2,300	330	2,100	304	2,300	326	2,100	301	2,300	328	2,100	303
Florida	16,700	205	14,700	180	19,000	214	16,600	188	20,500	221	18,000	194	22,900	229	20,100	200
Georgia	15,300	309	14,100	285	19,400	379	17,900	349	22,500	428	20,800	395	27,700	505	25,500	466
Maryland	6,200	148	5,500	132	6,900	158	6,200	141	7,400	166	6,600	148	8,200	176	7,300	157
North Carolina	10,800	201	9,300	173	11,900	215	10,200	185	12,600	223	10,900	192	13,700	235	11,800	202
South Carolina	6,000	218	5,500	199	7,000	246	6,400	224	7,700	263	7,000	239	8,700	288	7,900	262
Virginia	10,800	220	9,700	197	12,400	244	11,100	218	13,500	259	12,100	231	15,100	279	13,500	250
West Virginia	3,900	221	3,600	201	4,200	237	3,800	215	4,400	243	4,000	221	4,700	255	4,200	232
East South Central	35,300	262	32,600	242	39,000	284	35,900	262	41,500	296	38,100	272	45,200	315	41,600	290
Alabama	9,700	271	9,100	253	10,400	284	9,700	266	10,800	290	10,100	271	11,400	300	10,700	281
Kentucky	6,200	183	5,700	168	6,900	201	6,300	184	7,400	210	6,700	192	8,000	223	7,300	204
Mississippi	4,700	204	4,300	186	4,700	199	4,300	181	4,700	194	4,200	177	4,600	188	4,200	172
Tennessee	14,700	352	13,500	323	17,000	398	15,600	364	18,600	426	17,100	391	21,200	471	19,600	431

Table 37.--Projected active supply of licensed practical nurses in each State and region (Series II), selected years 1977-1985--Continued

	1977				1980				1982				1985			
	Total LPNs		FTE LPNs		Total LPNs		FTE LPNs		Total LPNs		FTE LPNs		Total LPNs		FTE LPNs	
	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/	Number	LPNs per 100,000 pop. 1/
West South Central	59,100	285	53,900	260	64,900	302	59,200	275	68,900	313	62,800	285	75,000	328	68,200	298
Arkansas	5,900	284	5,300	257	6,600	310	6,000	281	7,100	326	6,500	295	7,900	351	7,000	318
Louisiana	9,100	240	8,000	211	10,600	273	9,300	239	11,600	293	10,200	257	13,200	323	11,500	284
Oklahoma	6,700	246	6,200	226	7,900	282	7,300	259	8,700	304	8,000	279	10,000	336	9,200	308
Texas	37,400	308	34,400	283	39,800	315	36,600	289	41,500	319	38,100	293	43,900	324	40,300	297
East North Central	82,100	197	70,200	168	87,800	207	74,700	176	91,500	213	78,000	181	97,500	222	[illegible]	189
Illinois	15,100	133	13,200	116	14,500	126	12,600	110	14,200	122	12,400	106	14,000	118	[illegible]	103
Indiana	8,500	157	7,300	135	10,000	180	8,600	155	10,900	194	9,400	167	12,200	212	10,500	182
Michigan	21,600	233	18,300	197	23,600	248	19,900	209	24,900	258	21,000	218	27,000	272	22,800	230
Ohio	27,200	248	23,500	215	28,500	257	24,600	222	29,400	262	25,400	226	30,800	269	26,600	232
Wisconsin	9,700	209	7,900	170	11,200	235	9,000	190	12,100	250	9,800	202	13,500	270	10,900	218
West North Central	39,500	234	33,800	200	43,600	255	37,200	217	46,300	266	39,400	227	50,300	284	43,000	243
Iowa	6,800	237	5,800	200	7,700	265	6,500	223	8,300	281	6,900	236	9,100	305	7,600	257
Kansas	4,000	174	3,600	158	4,400	190	4,000	172	4,600	199	4,200	180	5,000	213	4,600	193
Minnesota	11,000	277	8,900	222	12,200	299	9,700	238	12,900	311	10,300	248	13,900	326	11,100	261
Missouri	10,700	221	9,500	196	11,600	235	10,300	208	12,300	245	10,800	217	13,300	261	11,800	231
Nebraska	3,900	249	3,400	217	4,600	288	4,000	250	5,000	312	4,400	271	5,700	348	5,000	303
North Dakota	1,700	263	1,400	224	1,600	260	1,400	220	1,600	255	1,400	216	1,600	251	1,400	213
South Dakota	1,400	201	1,200	173	1,500	217	1,300	187	1,600	226	1,400	194	1,700	243	1,500	209
Mountain	20,000	211	17,500	185	22,400	223	19,600	195	24,100	231	20,900	200	26,400	238	23,000	208
Arizona	4,000	184	3,500	162	4,500	191	4,000	168	4,900	196	4,300	172	5,400	201	4,800	177
Colorado	5,200	206	4,500	179	5,600	210	4,900	182	5,900	213	5,100	184	6,300	214	5,400	185
Idaho	2,400	299	2,100	260	2,600	317	2,300	274	2,800	327	2,400	284	3,100	345	2,700	299
Montana	1,600	212	1,400	188	1,700	220	1,500	195	1,700	222	1,500	197	1,800	226	1,600	200
Nevada	1,300	219	1,200	201	1,400	211	1,200	193	1,400	208	1,300	190	1,500	199	1,300	182
New Mexico	2,300	206	2,100	184	2,700	230	2,400	205	3,000	245	2,600	218	3,300	266	3,000	237
Utah	2,600	223	2,200	189	3,200	255	2,700	215	3,600	276	3,000	233	4,100	305	3,500	257
Wyoming	600	170	500	148	700	192	600	167	800	203	700	[illegible]	900	219	700	191
Pacific	63,300	223	56,000	197	74,800	253	66,000	223	83,000	275	73,200	242	95,800	305	84,600	269
Alaska	500	152	400	135	600	172	500	152	700	184	600	163	800	202	700	178
California	49,800	233	44,200	207	60,400	271	53,400	240	67,900	298	60,100	264	79,900	337	70,700	298
Hawaii	2,000	243	1,900	232	2,300	261	2,200	249	2,500	273	2,300	260	2,700	289	2,600	275
Oregon	3,600	155	3,100	134	3,800	158	3,300	136	4,000	160	3,400	138	4,200	161	3,600	139
Washington	7,400	208	6,400	180	7,700	211	6,600	182	7,900	313	6,800	183	8,200	214	7,000	184

1/ State population estimates projected by Vector Research, Inc.
Source: Estimates prepared by the Division of Nursing, Health Resources Administration, U.S. Department of Health, Education, and Welfare, 1977.
Note: FTE = full-time equivalent.

Table 38.--Comparison of adjusted 1/ and unadjusted 2/ full-time equivalent registered nurses per 100,000 population for counties, 1972 (percent of counties)

Unadjusted full-time equivalent registered nurses per 100,000 population 2/	Adjusted full-time equivalent registered nurses per 100,000 population 1/							
	Total 3/	0-100	101-200	201-300	301-400	401-500	501-600	over 600
Total	100.00	1.79	31.74	35.09	18.50	9.15	2.63	1.10
0 - 100	25.13	1.53	16.44	4.31	1.37	.91	.27	.30
101 - 200	29.79	.26	12.40	14.53	1.34	.72	.30	.24
201 - 300	22.69	--	2.33	11.06	7.63	1.37	.15	.15
301 - 400	12.62	--	.34	4.12	5.15	2.25	.57	.19
401 - 500	6.03	--	.19	.69	2.06	2.48	.61	--
501 - 600	2.48	--	--	.23	.80	.84	.50	.11
over 600	1.26	--	.04	.15	.15	.58	.23	.11

1/ The adjusted values are based upon the population resident in the county and numbers of full-time equivalent registered nurses, employed in or outside of the county, that provide service to the population resident in the county.

2/ The unadjusted values are based upon the population resident in the county and numbers of full-time equivalent registered nurses employed in the county.

3/ Includes 2,622 of the 3,110 county and county equivalent units in the United States (independent cities which are subareas of a county are considered part of that county and are not treated separately).

Source: Information and Communication Applications, Inc., Final Report - Conversion of the Nursing Resource - Service Distribution Assessment Model to an Interactive Mode - Analysis. In preparation.

Table 39.—Comparison of adjusted 1/ and unadjusted 2/ full-time equivalent registered nurses per 100,000 population for populations within counties, 1972 (percent of county populations)

Unadjusted full-time equivalent registered nurses per 100,000 population 2/	Adjusted full-time equivalent registered nurses per 100,000 population 1/							
	Total 3/	0 - 100	101 - 200	201 - 300	301 - 400	401 - 500	501 - 600	over 600
Total	100.00	.34	18.14	40.37	24.35	13.80	2.59	.41
0 - 100	5.28	.26	4.08	.69	.15	.07	.03	--
101 - 200	12.59	.08	4.71	6.26	.50	.40	.46	.18
201 - 300	30.76	--	8.34	16.22	4.91	1.23	.05	.01
301 - 400	28.12	--	.94	15.02	8.99	2.35	.71	.11
401 - 500	15.08	--	.06	1.73	6.94	5.83	.52	--
501 - 600	5.55	--	--	.41	2.54	1.99	.57	.04
over 600	2.62	--	.01	.04	.32	1.93	.25	.07

1/ The adjusted values are based upon the population resident in the county and numbers of full-time equivalent registered nurses, employed in or outside of the county, that provide service to the population resident in the county.

2/ The unadjusted values are based upon the population resident in the county and numbers of full-time equivalent registered nurses employed in the county.

3/ Includes approximately 92.8 percent of the 203 million residents of the county and county equivalent units in the United States (1970 Census data).

Source: Information and Communication Applications, Inc., Final Report - Conversion of the Nursing Resource - Service Distribution Assessment Model to an Interactive Mode - Analysis. In preparation.

Table 40.--Summary of demand for full-time equivalent nursing personnel in the District of Columbia metropolitan area, 1975-1980

Provider setting	Skill level	Year					
		1975	1976	1977	1978	1979	1980
Total	RN	9,963.1	10,231.4	11,393.8	12,428.4	13,575.9	15,078.6
	LPN	3,233.3	3,395.1	3,870.6	4,291.9	4,752.5	5,376.2
	Aide	6,103.5	6,195.7	7,001.7	7,742.6	8,453.2	9,586.7
Acute care	RN	5,791.5	5,934.7	6,946.7	7,816.6	8,825.3	10,150.8
	LPN	2,017.4	2,063.9	2,400.5	2,670.7	3,003.9	3,464.0
	Aide	4,087.9	4,179.5	4,819.1	5,330.9	5,963.9	6,792.2
Long-term care	RN	320.8	320.9	345.8	324.9	398.2	450.4
	LPN	272.1	272.2	296.4	332.8	345.2	393.8
	Aide	2,015.6	2,016.2	2,182.6	2,411.7	2,489.3	2,794.5
Ambulatory care	RN	828.3	869.2	910.1	951.0	991.9	1,032.8
	LPN	137.9	176.0	214.1	252.1	290.2	328.3
	Aide	--	--	--	--	--	--
Public and community health	RN	1,763.1	1,824.2	1,885.2	1,946.4	2,007.4	2,068.5
	LPN	121.5	136.5	151.1	165.7	180.5	195.3
	Aide	--	--	--	--	--	--
Other (nonprovider)	RN	1,259.4	1,282.4	1,306.0	1,329.5	1,353.1	1,376.1
	LPN	684.4	746.5	808.5	870.6	932.7	994.8
	Aide	--	--	--	--	--	--

Source: Gue, et al., A Micro Model for Assessing Nursing Manpower Demand and Supply, Final Report, Community Systems Foundation, Ltd., 1977.

Table 41.--Summary of supply of full-time equivalent licensed nursing personnel in the District of Columbia metropolitan area, 1975-1980

Skill level	Activity status	Year					
		1975	1976	1977	1978	1979	1980
Total	Active	12,875.6	13,466.9	14,123.3	14,802.6	15,533.1	16,301.3
	Licensed	23,480.0	24,635.0	25,870.0	27,173.0	28,547.0	30,014.0
RN	Active	10,091.2	10,556.3	11,079.6	11,601.0	12,174.7	12,781.1
	Licensed	17,875.0	18,786.0	19,759.0	20,794.0	21,889.0	23,069.0
LPN	Active	2,784.4	2,910.6	3,053.7	3,201.6	3,358.4	3,520.2
	Licensed	5,605.0	5,849.0	6,111.0	6,379.0	6,658.0	6,945.0

Source: Gue, et al., A Micro Model for Assessing Nursing Manpower Demand and Supply, Final Report, Community Systems Foundation, Ltd., 1977.

Table 42.-- Summary of differences between demand and supply for full-time equivalent licensed nursing personnel in District of Columbia metropolitan area, 1975-1980

Year	Demand		Supply		Difference	
	RN	LPN	RN	LPN	RN	LPN
1975	9,963.1	3,233.3	10,091.2	2,784.4	128.1	(448.9)
1976	10,231.4	3,395.1	10,556.3	2,910.6	324.9	(484.5)
1977	11,393.8	3,870.6	11,069.6	3,053.7	(324.2)	(816.9)
1978	12,428.4	4,291.9	11,601.0	3,201.6	(827.4)	(1,090.3)
1979	13,575.9	4,752.5	12,174.7	3,358.4	(1,401.2)	(1,394.1)
1980	15,078.6	5,376.2	12,781.1	3,520.2	(2,297.5)	(1,856.0)

Source: Gue, et al., A Micro Model for Assessing Nursing Manpower Demand and Supply, Final Report, Community Systems Foundation, Ltd., 1977.

Appendix III

Excerpts from: Personnel Needs and Training for Biomedical and Behavioral Research. The 1977 Report of the Committee on A Study of National Needs for Biomedical and Behavioral Research Personnel, Volume I, Commission on Human Resources, National Research Council, National Academy of Sciences, Washington, D.C., 1977

Chapter I, p.3

"In the spring of 1976 the Congress passed the Health Research and Health Services Amendments of 1976, Title II of which extended the NRSA authority to include the research training programs of the Division of Nursing of the HRA. The Committee responded to this Congressional action by appointing nurse investigators as members of three of its five advisory panels (Behavioral Sciences, Clinical Sciences, and Health Services Research), and by establishing nursing research as a fifth broad area for study by the Committee. The current report thus presents for the first time a discussion of and specific recommendations for advanced training in the area of nursing research (Chapter 7)."

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"The Committee believes that it is important that the leaders and teachers in the nursing profession be in a position to contribute to the advancement of knowledge in fields related to nursing.

"The optimum institutional arrangements for fostering research training in the area of "caring" for the patient are not yet entirely clear. Several leading schools of nursing are eager to develop qualified graduate programs. In most cases these should probably be related to other departments in the university that are prepared to offer basic training in other fields of biomedical and behavioral sciences. Whether the overall supervision of such programs should be administered by the nursing school itself or the school of graduate studies that includes the other affiliated basic science departments is an administrative detail that will undoubtedly vary from institution to institution.

"While this experimentation with appropriate curricula and administrative arrangements is proceeding, the Committee believes that government agencies should adopt a sympathetic and encouraging attitude and be prepared to provide funding either in the form of research training fellowships or carefully designed research training grants as fully qualified graduate programs in schools of nursing become identified.

"The situation is rapidly changing, and the Committee thus regards any quantitative suggestion it may make at this time as tentative and subject to modification on an annual basis. However, the obvious demand for teachers and researchers with graduate training in nursing research makes it likely that training funds could be productively used for the next several years on an expanding basis.

"The Committee recognizes that there is often no clear line of demarcation between nursing research and other areas of biomedical and behavioral research. Some flexibility in classification of particular projects by the Division of Nursing is therefore necessary to implement the following Committee recommendations.

Predoctoral/Postdoctoral Training

"There is evidence of rapid expansion in graduate enrollments in schools of nursing today, and a real need to strengthen faculty through an increase in doctorally trained nurses capable of providing necessary leadership through research and teaching. As NRSA authority has been extended to the Division of Nursing, it is clear that predoctoral training continues to be the appropriate level for research training emphasis at this time.

"However, the Committee is also aware that nursing research as an area of inquiry can advance if support for postdoctoral training is also provided, particularly for those nurses who have completed their doctoral training in prior years and now wish to update their research skills.

"As a result, the Committee suggests that a small proportion of both traineeships and fellowships be made available for postdoctoral research training in the coming years and that this proportion increase at the rate prescribed below.

"Recommendation. The Committee recommends that, as properly qualified candidates present themselves, up to 15 percent of the total number of research training awards made available through the Division of Nursing in FY 1979 be made at the postdoctoral level. The Committee recommends that this proportion be increased as evidence suggests such an increment to be appropriate (see Table 7.2). The Committee intends these levels only as guidelines and recognizes that there may not be a sufficient number of well-qualified applicants for postdoctoral training in nursing research to take advantage of this opportunity in the near future.

TABLE 7.2 Recommended Distribution of Predoctoral and Postdoctoral Awards for Training in Nursing Research: FY 1979, 1980, and 1981

Level of Training	Fiscal Year 1979	1980	1981
TOTAL	225	240	270
Predoctoral	193	190	205
Postdoctoral	32	50	65

Traineeships

"As in other emerging areas of scientific inquiry, the training grant plays an important role in nursing research by bringing the theory and methods of the basic sciences to the problems of nursing care.

"Training grants may be given to schools of nursing to establish interdisciplinary programs for nurses in cooperation with university departments of basic science. In this situation traineeships are given to nurses to study toward doctoral degrees in nursing and in the biological, physical, or behavioral sciences.

"With the growth of a distinct body of knowledge in nursing research it is also possible at this time to place a limited number of training grants in well-qualified schools of nursing for the purpose of providing training in this area. The traineeship is given to the nurse to take up research training in a graduate department of nursing.

"The Committee is cognizant of the need to stimulate nursing research and the production of adequately trained nurse-doctorates at this time through the training grant. At the same time, owing to the scope of training provided through this mechanism by the Division of Nursing today, the Committee is aware of the need to proceed gradually as this program is put into place, in a manner that will assure the provision of awards to graduate departments that are ready to provide training in nursing research comparable in quality to training provided for Ph.D.'s in other areas.

"As a result, the Committee has been able only to suggest through its recommendations this year the direction of growth sought through this program of traineeship awards. It is the Committee's intention to review these recommendations in the coming year in light of additional data that will be made available to the Committee by the Division of Nursing, and to make whatever adjustments that are useful to foster training through this program of awards.

"Recommendation: The Committee recommends that the program of institutional grant support for research training provided by the HRA Division of Nursing be expanded to meet the needs for investigators in nursing research. In view of the limited program of support in FY 1977, the Committee recommends that the program be expanded gradually to a total of 95 traineeship awards in FY 1981 (see Table 7.3). In addition to providing awards for training in basic science departments affiliated with nursing schools, the Committee also recommends that a limited number of awards be provided for research training in graduate departments of well-qualified schools of nursing in the area of nursing research. The Committee will review its recommendations in the coming year to determine whether further adjustments are necessary either in the total number of awards recommended or in allocation by training site.

TABLE 7.3 Recommended Distribution of Traineeships in Nursing Research by Institutional Setting: FY 1979, 1980, and 1981

	Fiscal Year		
Research Training Site	1979	1980	1981
TOTAL	50	65	95
Grad. depts. of nursing[a]	10	15	20
Nonnursing depts.[b]	40	50	75

[a] "Grad. depts. of nursing" refers to research traineeships made available to nurses through institutional training grants put into graduate departments in schools of nursing.

[b] "Nonnursing depts." refers to research traineeships made available to nurses through institutional training grants administered jointly by graduate departments in schools of nursing and departments of basic science outside the schools of nursing, providing a "dual tract" program of training for the nurse scientist.

Fellowships

"Nurses have had fellowships in the past for doctoral training in the biological and behavioral sciences, as well as for training in such fields as education, educational administration, and public health administration. It is the belief of the Committee that research training in areas relevant to the enhancement of nursing education, administration, and curriculum development is appropriate under the auspices of NRSA support. However, the Committee would like to stress that training emphasis in nonscience areas should be on research and not on professional training, since it is research training that will advance research on nursing care.

"In view of the need to increase the number of doctorally trained nurses in the area of nursing research, the Committee views as an important first step the reorientation of the fellowship program under the auspices of NRSA support.

"The Committee recommends a substantial reduction in fellowship support in nonscience departments outside the schools of nursing, and, in view of the growing capability among well-qualified schools of nursing to take up research training at this time, the Committee recommends that a limited number of awards be used for training in schools of nursing as well as in other parts of the university interested in the problems of nursing care. This reorientation, furthermore, should be accomplished through the maintenance of the total number of awards through FY 1981.

"Recommendation: The Committee recommends that a significant reorientation take place in the fellowship award program while maintaining the program at a total comparable to the estimated number of awards in FY 1978 (175 awards). The Committee recommends a substantial reduction in the number of awards for research training in nonscience departments. The Committee also recommends a shift in training emphasis to provide research training opportunities to nurses in well-qualified graduate departments both within schools of nursing and in other departments interested in the problems of nursing care. In this way research training through the fellowship mechanism will assure the advancement of nursing research. In view of the impact of this proposed reorientation, the Committee will review its recommendations in the coming year to determine whether further adjustments are necessary, either in the total number of awards recommended or in the allocation by type of training site (Table 7.4)."

TABLE 7.4 Recommended Distribution of Fellowships in Nursing Research by Institutional Setting: FY 1979, 1980, and 1981

	Fiscal Year		
Research Training Site	1979	1980	1981
TOTAL	175	175	175
Grad. depts. of nursing[a]	50	75	100
Nonnursing depts. total[b]	125	100	75
Basic science depts.	75	75	75
Nonscience depts.	50	25	0

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[a] "Grad. depts. of nursing" refers to research fellowships made available to nurses for research training in schools of nursing.

[b] "Nonnursing depts." refers to research fellowships made available to nurses to take up training either in basic science departments outside schools of nursing (basic science depts.) or in such professional/applied schools as schools of education or schools of business administration (nonscience depts.).

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SUMMARY

"The Committee's recommendation is made in light of the knowledge that institutional support has been forthcoming from the Advance Nurse Training Programs of the Nurse Training Act of 1975 (PL 94-63). The research training grants available under the NRSA Act will not duplicate the quite different grants now available under the new authority of the Nurse Training Act, which is directed toward advanced professional training for nurses rather than for research training.

"In recommending a maintenance of the total number of fellowship awards through FY 1981, the Committee is cognizant that a growing interest in advanced training within the professional sector may require, ultimately, an expansion of this program. However, the Committee at this time has not had available to it the information necessary to determine any further growth of this program. Instead, the Committee views as an important and necessary first step, the reorientation of emphasis in training away from nonnursing professional fields toward direct experience in nursing research as provided by schools of nursing and in basic science departments relevant to nursing research. Table 7.5 specifies the distribution of these awards for traineeships and fellowships. Specifically, up to 15 percent of the total number of traineeships and up to 15 percent of the total number of fellowships recommended for FY 1979 should be made available at the postdoctoral level. Similarly, up to 20 percent of the traineeships and up to 20 percent of the fellowships in FY 1980 should be for postdoctoral training, and up to 25 percent in each category in FY 1981, should evidence accrue suggesting that such an expansion is possible.

"As recommended by this Committee, the future direction of research training provided through the programs administered by the HRA Division of Nursing would be that shown in Figure 7.2."

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TABLE 7.5.--Recommended distribution of predoctoral and postdoctoral traineeships and fellowships for training in nursing research: FY 1979, 1980, and 1981

Fiscal Year		Traineeships	Fellowships	Total
1979	Total	50	175	225
	Predoctoral	43	150	193
	Postdoctoral	7	25	32
1980	Total	65	175	240
	Predoctoral	50	140	190
	Postdoctoral	15	35	50
1981	Total	95	175	270
	Predoctoral	70	135	205
	Postdoctoral	25	40	65

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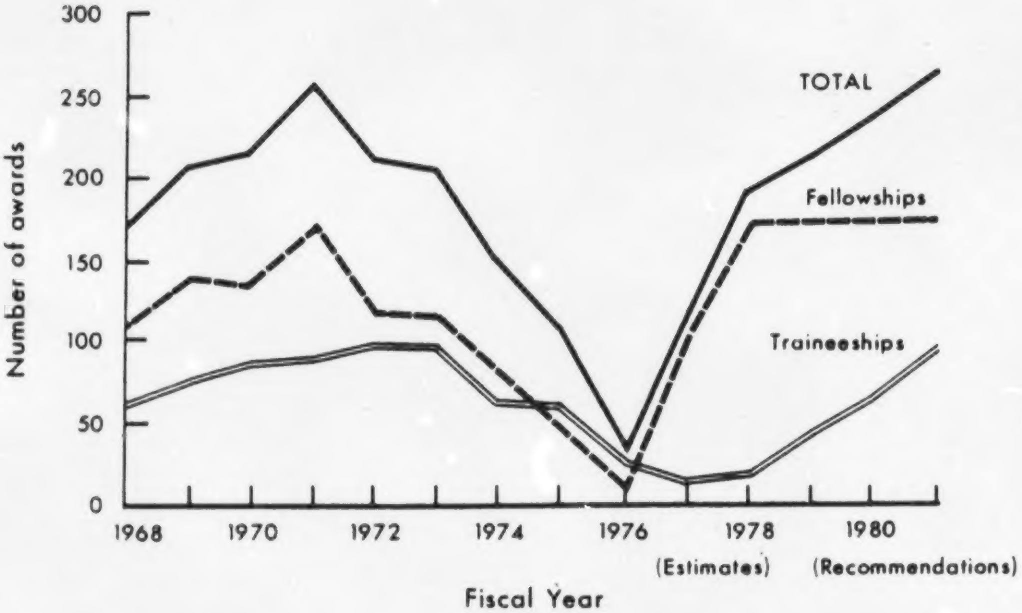
Figure 7.2 - Distribution of traineeships and fellowships for training in nursing research including Committee's recommended levels for FY 1979, 1980, and 1981.



Appendix IV

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